# eBay–eConomics: Factors that Determine Online Auction Prices

**Günter Schamel**
**Dept of Ag Economics and Social Sciences**
**Humboldt University at Berlin**
**Berlin, GERMANY 10099**
**g.schamel@rz.hu-berlin.de**

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### 1. Introduction

The popularity of online auctions is a relatively recent phenomenon. eBay, the leading online auctioneer, is one of the most popular websites and has become synonymous for trading online. Wine is a good well suited for online trading and there is a huge market for it on eBay's websites in France and Germany. Buying and selling Bordeaux reds is especially popular on eBay in Germany where about 2,000 auctions are available at any given time. Many wine enthusiasts and traders have discovered online auctions to trade wine and availability of Bordeaux is even larger than on the French site.

In this paper, we analyze final prices for premium Bordeaux auctioned on eBay.de. We recorded about 2,200 transactions to evaluate the impact of online variables such as auction length, day and time when the auction expires, seller reputation or whether bidder identities remain undisclosed (private auctions). About 40% of all sellers report Robert Parker's point rating when listing their Bordeaux wine. Thus, we also obtained information on Parker points and whether this sensory quality information is stated in the offer. Using a hedonic pricing model, we estimate buyer willingness to pay for product quality attributes including Parker points, the 1855 classification, château reputation (brands), regional origin, and wine age. Dependent variable is the final auction price per bottle plus shipping costs. We correct the model with eBay specific control variables such as the day and time of the auction end, auction length, number of bids, seller reputation, initial price, private auctions, as well as whether Parker's sensory quality information is stated in the offer. We also estimate two sub-models: auctions with page count indicating buyer interest and auctions with a low initial bid equal to 1€ (reserve

price auctions are not available). Our application is unique because eBay auctions (especially for premium wine) have not been analyzed in this detail in the literature.

## 2. The (Online-)Auction Literature

Auctions have been extensively studied by economists to understand their properties as a dynamic pricing market structure (e.g. Vickrey, 1961; Milgrom and Weber, 1982; McAfee and McMillan, 1997). This literature involves both analytical models and empirical testing. The different auction mechanisms studied include the English auction (or ascending-bid auction), the Dutch auction (descending-bid auction), the first-price sealed-bid auction, and the Vickrey auction (second-price sealed-bid auction). For a comprehensive overview of the literature on auction theory refer to Klemperer (1999).

In markets with asymmetric information properties, economists worry about adverse selection (i.e. sellers may have hidden information about the quality of the good). In his seminal paper, Akerlof (1970) demonstrated that if, at the time of sale, only the seller knows whether a used car is a “lemon”, it can be that there is no equilibrium where cars are sold. Thus, Akerlof's analysis is quite pessimistic about whether markets are able to function with adverse selection. Other authors (e.g. Shapiro 1983) have suggested that reputation indicators might be a mechanism that allows markets to function in the presence of adverse selection. If seller gain a reputation for honest behavior, such as making full disclosure of all information about a particular product, then markets can have a positive level of trade. Online auction sites attempt to solve this information problem through a feedback system. After auctions are completed, eBay allows both the seller and the winning bidder to rate one another in terms of reliability and timeliness in payment and delivery. Ratings are given as a positive, negative or neutral response. Next to each buyer or seller’s eBay ID (usually a pseudonym or nickname), the number of net

positive responses is displayed. By clicking on the seller's eBay ID, bidders can view all of the seller's feedback, including all comments as well as statistics totaling the total number of positive, neutral and negative comments.

Very few studies have used data collected directly from Internet auction sites to analyze customer-bidding behavior. Lucking-Reiley (2000) presents an overview of what is auctioned online and how is auctioned off. Lucking-Reiley et al (2000) analyze online auction prices for collectible one-cent coins on eBay. Their main findings are that seller feedback ratings have a measurable effect on her auction prices (negative ratings have a much greater effect than positive ratings), minimum bids and reserve prices have positive effects on the final auction price, and that on average longer lasting auctions result in significantly higher prices. A number of studies have provided estimates for the value of reputation in eBay auctions (e.g. Houser and Wooders 2000, Lucking-Reiley et al 2000). All authors find that the amount of negative feedback reputation is negatively correlated with the sale price and that the amount of positive feedback is positively correlated with the sale price, although estimates on how much bids would increase as a function of a seller reputation are rather small. Houser and Wooders estimate that a ten percent increase in positive feedback points increases the winning bid by only 0.17% and a ten percent increase in negative comments reduces the sale price by 0.24%. Lucking-Reiley et al find that a 1 percent increase in the seller's positive feedback raises prices by 0.03% and a 1 percent increase in negative feedback decreases prices by 11%.

Resnick and Zeckhauser (2001) also found that reputation ratings might have a positive price effect. Wilcox (2000) found that more experienced bidders tend to bid more rationally than less experienced bidders. Also analyzing eBay data for rare coins, Wood and Kauffman (2001) identified four trends that may explain why auction buyers pay more or less for the same item:

weekend, auction length, reputation score, and picture effects. Auctions ending during the weekend yielded higher prices than auctions ending on weekdays (weekend effect). Thus, the weekend effect is a personal characteristic, not a market characteristic and may indicate that people are willing to pay more for the same item when they have more time to consider the purchase. Auctions that last longer attract more bidders and thus higher prices (auction length effect). Seller reputation may also yield a price premium (reputation score effect). However, since eBay reputation scores tend to increase with time and activity it may in fact measure experience rather than reputation. Moreover, Wood and Kauffman (2001) suggest that items sold online but shown with an actual picture might also sell for a premium (picture effect). As they suggest that this might be due to demanding buyers who expect sellers to present all information available using advanced technology. We would argue that this might no longer be accurate since digital imaging has become almost an everyday household application today.

In addition to some of the eBay specific indicators analyzed in other studies, we take a closer look at the effects of the auction ending time during the day on the final bids. Timing the final bid by the seller has received little attention in this literature. Analyzing buyer behavior, Roth and Ockenfels (2002) have examined the phenomenon that experienced buyers tend to bid during the very final phase of an eBay auction (sniping). We also include product quality indicators for wine, which have been analyzed using hedonic models with retail prices. Our application is unique because eBay auctions (especially for premium wine) have not been analyzed in this detail in the literature.

## 3. Data and Analysis

During the months of November and December 2003, we collected an extensive data set of about 2,200 transactions of top range Bordeaux wines sold on the German eBay site. Note that

in this paper, we present preliminary estimation results for the first 1071 auctions recorded. Our objective is to examine important factors that determine final online auction prices received. In addition to the final price per bottle, we recorded variables such as the initial bid, shipping costs, lot size (number of bottles offered), auction length, day and timing of auction end, number of bids, buyer interest (page count), seller reputation (percentage of positive peer evaluations) and experience (number of completed transactions, length of membership). We also recorded if the auction was public (sealed bids until the auction ends with bidder identities know to others) or private (bids and identity of bidders remain unknown even after the auction ends), or whether relevant sensory quality information is stated in the offer or not. Many sellers also report Robert Parker's point rating when listing their Bordeaux. Thus, we use Parker points and other quality signals such as the 1855 classification, premium brands, regional origin, and wine age in addition to eBay specific data and estimate a hedonic pricing model to test which factors influence online auction prices for premium Bordeaux wine.

Figures 1 through 5 depict specific characteristics of the data. Figure 1 shows the distribution of lot size (number of bottles on offer). Note that in more than 80% of all the transactions that we recorded only a single bottle is offered. Figure 2 depicts the distribution of auction lengths. eBay allows auctions to last for 1, 3, 5, 7, or 10 days, but most auctions (70%) last a week or more. Figure 3 is a histogram of auction ending times during the day and at night. We group auction-ending times in the morning and in the afternoon when online time is more expensive and people are typically at work (at least during the week). During the early and late evening, we separate ending times by the hour. Note that most auctions end in evening between 2100 and 2200 hours CET. Figure 4 depicts the representation of the major Bordeaux appellations in the sample. Finally, in Figure 5, we present a histogram for the number of online

bids placed. Note that between 5 and 15 bids are placed in roughly 2/3 of all auctions and less than 10% of all auctions attract more than 20 bids.

We use the data set to estimate a hedonic pricing model to estimate buyer willingness to pay for product quality attributes including Parker points, the 1855 classification, château reputation (brands), regional origin, and wine age. We correct the model with eBay specific control variables such as the day and time of the auction end, auction length, number of bids, seller reputation, initial price, private auction impact, picture effect as well as whether Robert Parker's sensory quality information is stated in the offer or not. Note that the day and time of the auction end as well as appellation are categorical dummy variables. Hence, we choose Sunday evening between 21h–22h CET as base categories and "Other" as the base appellation in the estimation.

## 4. Empirical Results

In Table 1, we present the empirical estimation results for the first 1,071 observations in our data set. We present results for the main model (M1) as well as for two sub-samples. Model M2 considers only auctions showing a page count at the bottom, which is an indicator of buyer interest in the item. Reserve price auctions (with hidden minimum prices) are not allowed on the German eBay site. Thus, we estimate Model M3 which looks only at auctions when the initial bid (excluding shipping) equals 1€ which can be regarded an indicator for seller confidence that the online auction will eventually result in a fair final bid for the item offered. In what follows, we present the key results for the main model and chief differences in the results for the other two models. First, we present the results for the control variables.

In contrast to other studies, our data suggests that the seller reputation (positive vs. negative feedback) has no significant price effect (except for Model M3). Moreover, only wines

sold on Fridays command significantly higher prices (+8.6%) relative to the Sunday base. Hence, we unable to confirm a weekend effect which is in contrast to Wood and Kauffman (2001). Interestingly, we observe that most auctions expire on Saturday and Sunday evenings. The missing weekend effect may be explained by lack of market depth on weekends: not enough buyers might be around to bid during the weekend when many auctions expire such that supply exceeds demand. Moreover, time of day effects are insignificant relative to the base period (21h-22h CET), except when auctions end in the morning (8h-12h CET) or late evening (22h-23 CET) and prices are 11% lower.

However, we observe a small auction length effect (+2%). Note that this effect could decline as the online auction market increases in depth: more and more buyers search for deals, thus increasing shorter auctions' ability to attract bidders. We also notice that there is a significant, but negative picture effect (–5.6% for M1 and –7.5% for M2). While this at first seems counterintuitive, we think that this is mainly due to the negligence of many sellers to upload “real” pictures of their items. Often, sellers just use a proxy picture collected from the Internet which sometime does not even show the correct vintage. Thus, many buyers might rather rely on (and pay a premium for) a detailed and knowledgeable description of the wine instead of a picture. In line with traditional demand analysis, the number of bottles sold in an individual auction exhibits a negative price impact – selling another bottle decreases the price per bottle by about 4%. Using the page count measure in model M2, we estimate a low elasticity of buyer interest (0.13).

We looked at three other indicators. First, the number of bids showed a significant but small 1.7% impact on the final price. Second, when the bidder identity remains unknown to non-bidders (private auctions), final price are about 5% higher on average. Finally, we estimate a

significant information disclosure effect. Although sellers could be inclined to only reveal higher Parker ratings, we did not observe that this was more likely. According to the estimation, disclosing Parker points as credible quality information in the offer carries a premium of more than 12%. Note that this premium is somewhat lower in Model M2.

Finally, let us also present implicit prices for product quality attributes used in more traditional hedonic models. As expected, Parker points showed the highest significance with a price elasticity of about 3.6 (or 3.50€ at the average final price). Other quality signals such as brands (e.g. Châteaux Pétrus) and regional origin are all significant.[1] Interestingly, premiums for the famous 1855 classification levels are significant and in correct order except for Quatrièmes Crus. Moreover, notice that we estimate only about a 2% premium per year of maturation and a tiny 0.2% premium for adding to the initial price per bottle.

## 5. Recommendations and Conclusions

This paper is relevant as it sheds some light on potential factors determining online auction prices for wine as well as on the economics of online auction prices in general. In contrast to other studies, the seller reputation effect showed no significant impact on final auction prices in our sample. Moreover, we do not find a significant weekend effect. Time of day effects are insignificant relative to the base period (21h-22h CET), except when auctions end in the morning (8h-12h CET) or late evening (22h-23 CET). Auction length, the number of bids, disclosing parker points and private auctions exhibit significant price effects. We also estimate a significant but negative picture effect, which as we argue may be due to the negligence of many sellers to upload "authentic" pictures. For sellers, we recommend to offer *single* bottles in a 10 day *private* auction that expires on a Friday but not in the morning or late evening. They should

[1] Margaux is insignificant, but this may disappear once the complete sample is in a usable format.

also include knowledgeable description of the wine including Parker points and upload an "authentic" picture. Buyers should bid for *multiple* bottles on offer in a 1-day *public* auction that expires during the morning or late evening except on Fridays. They should prefer items with an initial bid equal to 1€ from a seller with a high reputation, but without a detailed description and with no information on Parker points.

**Table 1: Estimation Results: Dependent variable = log(Final Price/Bottle)**

| | M1: Main Model | | | M2: Visit Count | | | M3: Initial Bid=1€ | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | estimate | t | p-value | estimate | t | p-value | estimate | t | p-value |
| CONSTANT | -14.86* | -14.92 | 0 | -15.05* | -13.02 | 0 | -16.11* | -14.35 | 0 |
| log(PP) | 3.643* | 22.80 | 0 | 3.655* | 19.83 | 0 | 3.706* | 20.75 | 0 |
| PP disclosed | 0.124* | 5.35 | 0 | 0.099* | 3.81 | 0 | 0.123* | 4.74 | 0 |
| Initial Price/Bottle | 0.002* | 8.61 | 0 | 0.002* | 6.25 | 0 | 0.016* | 2.82 | 0.005 |
| Seconds Crus | 0.566* | 5.79 | 0 | 0.529* | 4.78 | 0 | 0.612* | 5.00 | 0 |
| Troisièmes Crus | 0.408* | 3.68 | 0 | 0.346* | 2.78 | 0.005 | 0.437* | 3.23 | 0.001 |
| Quatrièmes Crus | 0.211† | 2.07 | 0.038 | 0.164 | 1.41 | 0.160 | 0.258† | 2.05 | 0.041 |
| Cinquièmes Crus | 0.295* | 2.96 | 0.003 | 0.245† | 2.18 | 0.030 | 0.347* | 2.78 | 0.005 |
| Cru Bourgeois | 0.150* | 1.55 | 0.122 | 0.177 | 1.56 | 0.118 | 0.162 | 1.32 | 0.186 |
| St Emilion Premier Cru | 0.324* | 4.43 | 0 | 0.339* | 4.08 | 0 | 0.251* | 3.13 | 0.002 |
| Wine Age | 0.021* | 16.22 | 0 | 0.018* | 12.10 | 0 | 0.020* | 14.01 | 0 |
| Bids | 0.017* | 8.61 | 0 | 0.009* | 3.31 | 0.001 | 0.019* | 8.14 | 0 |
| Bottles | -0.036* | -7.15 | 0 | -0.041* | -6.68 | 0 | -0.030* | -4.19 | 0 |
| Auction Length | 0.020* | 4.61 | 0 | 0.010† | 1.97 | 0.049 | 0.023* | 4.77 | 0 |
| Seller Reputation | 0.012‡ | 1.83 | 0.067 | 0.011 | 1.41 | 0.158 | 0.020* | 2.65 | 0.008 |
| Private Auction | 0.049* | 2.02 | 0.043 | 0.083* | 3.09 | 0.002 | 0.057† | 2.15 | 0.032 |
| Monday | 0.041 | 1.38 | 0.169 | 0.000 | -0.01 | 0.990 | 0.045 | 1.37 | 0.172 |
| Tuesday | 0.038 | 0.81 | 0.418 | -0.027 | -0.47 | 0.642 | 0.026 | 0.47 | 0.640 |
| Wednesday | 0.034 | 1.00 | 0.318 | 0.010 | 0.24 | 0.808 | 0.012 | 0.33 | 0.742 |
| Thursday | 0.055 | 1.42 | 0.156 | 0.061 | 1.34 | 0.180 | 0.050 | 1.15 | 0.250 |
| Friday | 0.086* | 2.58 | 0.010 | 0.064‡ | 1.72 | 0.085 | 0.088† | 2.42 | 0.016 |
| Saturday | 0.019 | 0.52 | 0.604 | 0.002 | 0.06 | 0.956 | 0.027 | 0.63 | 0.531 |
| Margaux | 0.069 | 0.93 | 0.354 | 0.077 | 0.88 | 0.376 | -0.005 | -0.06 | 0.949 |
| Pauillac | 0.308* | 5.10 | 0 | 0.317* | 4.69 | 0 | 0.267* | 3.84 | 0 |
| Graves/Pessac-Léognan | 0.689* | 6.53 | 0 | 0.710* | 5.56 | 0 | 0.755* | 5.66 | 0 |
| Pomerol | 0.927* | 9.52 | 0 | 0.979* | 8.60 | 0 | 0.951* | 7.61 | 0 |
| St. Julien | 0.211* | 3.33 | 0.001 | 0.236* | 3.26 | 0.001 | 0.187* | 2.59 | 0.010 |
| St. Estephe | 0.270* | 4.14 | 0 | 0.286* | 3.77 | 0 | 0.244* | 3.24 | 0.001 |
| St. Emilion | 0.464* | 4.52 | 0 | 0.438* | 3.71 | 0 | 0.478* | 3.73 | 0 |
| Château Pétrus | 1.478* | 16.65 | 0 | 1.357* | 13.84 | 0 | 1.504* | 14.71 | 0 |
| Château Margaux | 1.485* | 12.41 | 0 | 1.490* | 10.91 | 0 | 1.562* | 10.93 | 0 |
| Château Mouton | 1.231* | 11.99 | 0 | 1.168* | 10.06 | 0 | 1.310* | 10.26 | 0 |
| Château Lafite | 1.113* | 10.57 | 0 | 1.080* | 9.08 | 0 | 1.161* | 8.95 | 0 |
| Château Latour | 1.021* | 9.27 | 0 | 0.981* | 7.97 | 0 | 1.068* | 7.83 | 0 |
| Château Cheval Blanc | 0.849* | 9.05 | 0 | 0.846* | 7.72 | 0 | 0.977* | 9.34 | 0 |
| Château Palmer | 0.657* | 7.08 | 0 | 0.684* | 6.79 | 0 | 0.692* | 6.74 | 0 |
| Château Haut-Brion | 0.596* | 7.74 | 0 | 0.581* | 5.90 | 0 | 0.557* | 6.48 | 0 |
| Picture | -0.056† | -2.41 | 0.016 | -0.075* | -2.80 | 0.005 | -0.055† | -2.12 | 0.034 |
| Time 23-08 | -0.002 | -0.04 | 0.968 | -0.006 | -0.09 | 0.927 | 0.046 | 0.63 | 0.526 |
| Time 08-12 | -0.114† | -2.23 | 0.026 | -0.135† | -2.44 | 0.015 | -0.097‡ | -1.82 | 0.068 |
| Time 12-17 | -0.034 | -1.02 | 0.307 | -0.052 | -1.37 | 0.171 | -0.072‡ | -1.95 | 0.052 |
| Time 17-18 | 0.006 | 0.13 | 0.895 | -0.053 | -1.10 | 0.272 | -0.025 | -0.53 | 0.595 |
| Time 18-19 | -0.079‡ | -1.90 | 0.057 | -0.105† | -2.12 | 0.034 | -0.093† | -1.96 | 0.050 |
| Time 19-20 | -0.059 | -1.60 | 0.109 | -0.082‡ | -1.91 | 0.056 | -0.050 | -1.28 | 0.200 |
| Time 20-21 | -0.054 | -1.55 | 0.122 | -0.055 | -1.46 | 0.145 | -0.048 | -1.30 | 0.194 |
| Time 22-23 | -0.106† | -2.45 | 0.014 | -0.109† | -2.38 | 0.018 | -0.095† | -2.01 | 0.044 |
| log(Visit Count) | --- | --- | --- | 0.138* | 4.60 | 0 | --- | --- | --- |

**Table 1 (con't): Estimation Results: Dependent variable = log(Final Price/Bottle)**

| | | | |
|---|---|---|---|
| $R^2$ (adj. $R^2$) | 0.837 (0.829) | 0.844 (0.835) | 0.836 (0.827) |
| N | 1071 | 834 | 888 |

Note: ‡, †, and * indicate significance at the 10%, 5%, and 1% level, respectively.

**Figure 1: Lot Size (# of bottles)**

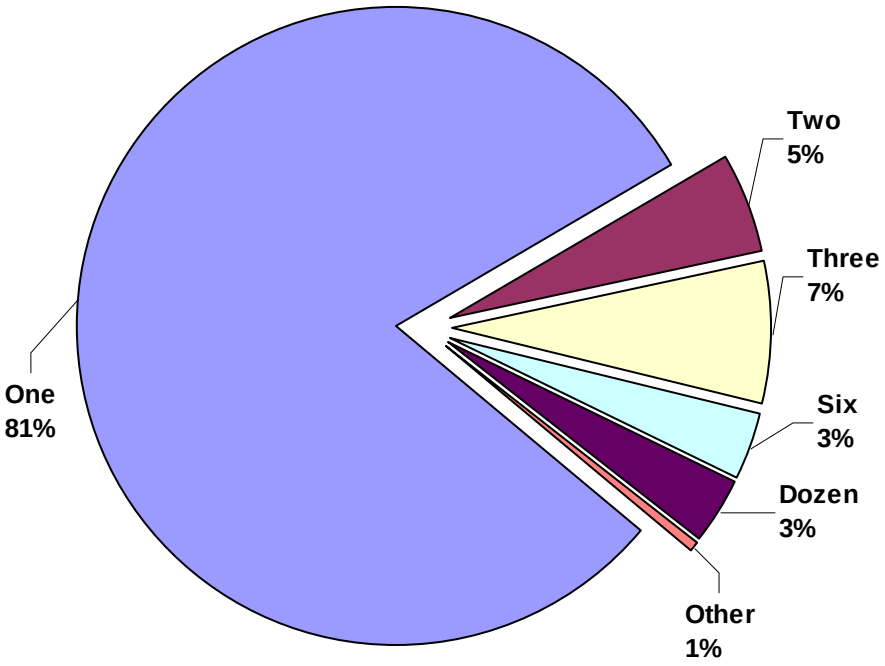


**Figure 2: Histogram for Auction Length**

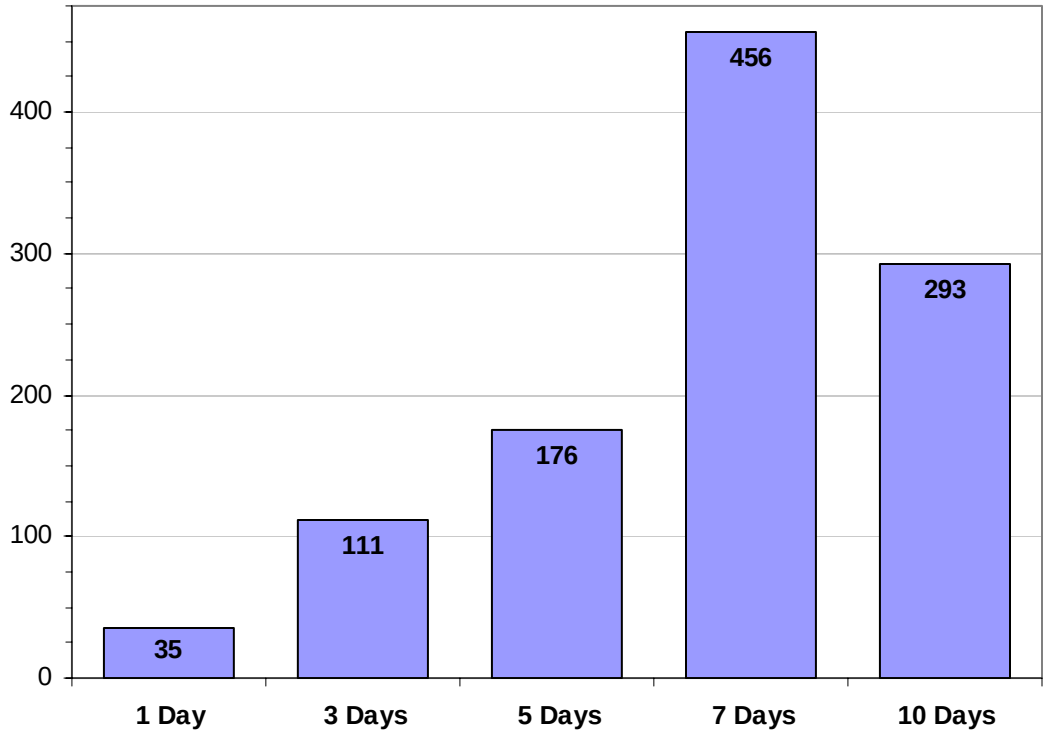


**Figure 3: Histogram for Auction Ending Times**

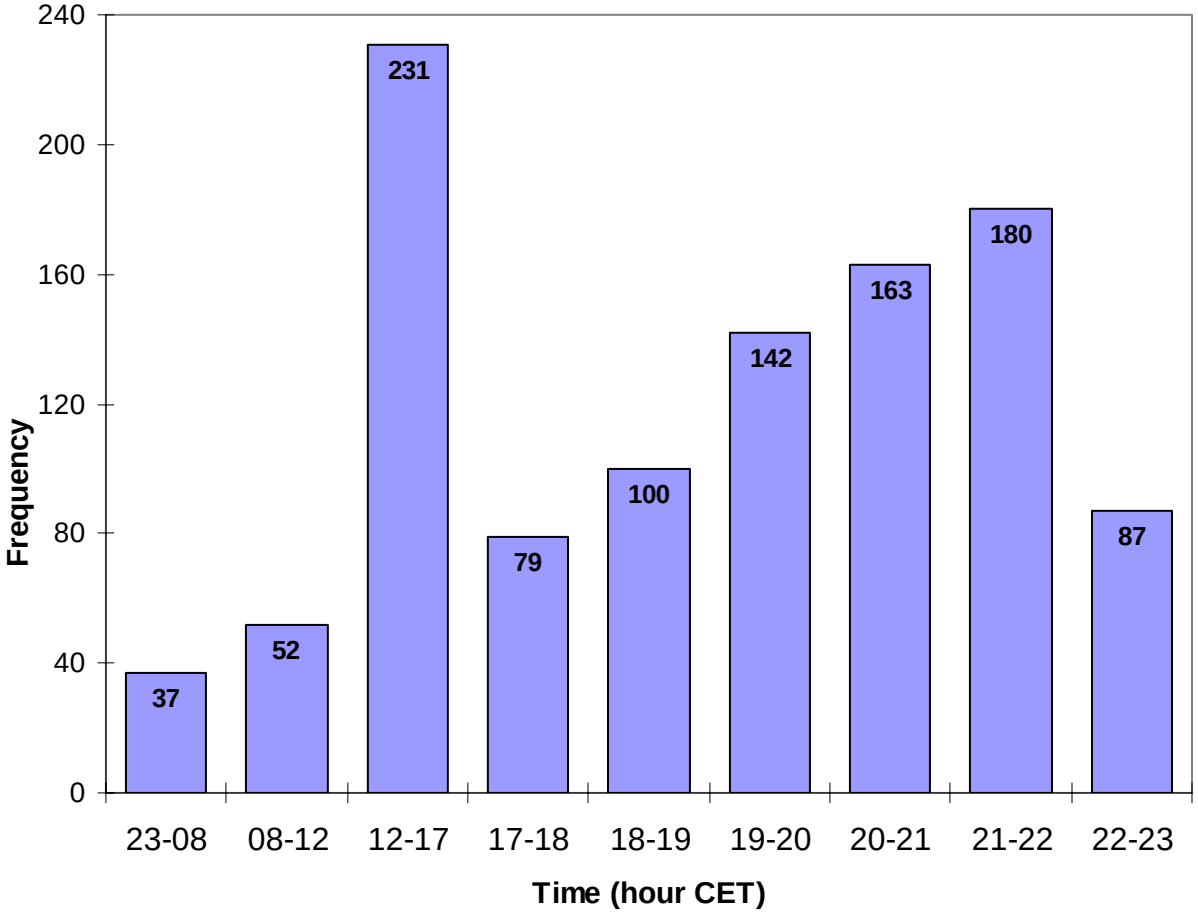


**Figure 4: Appelations**

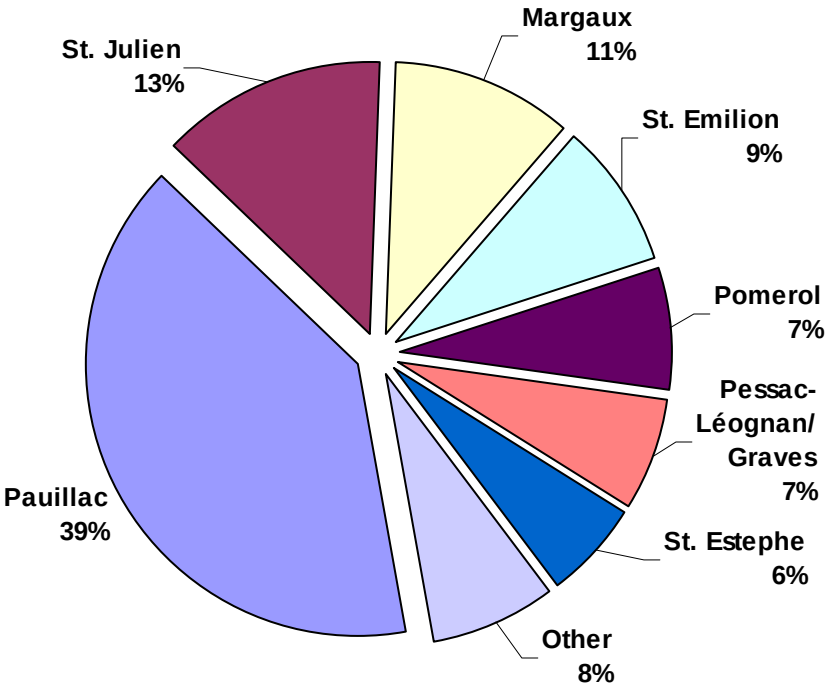
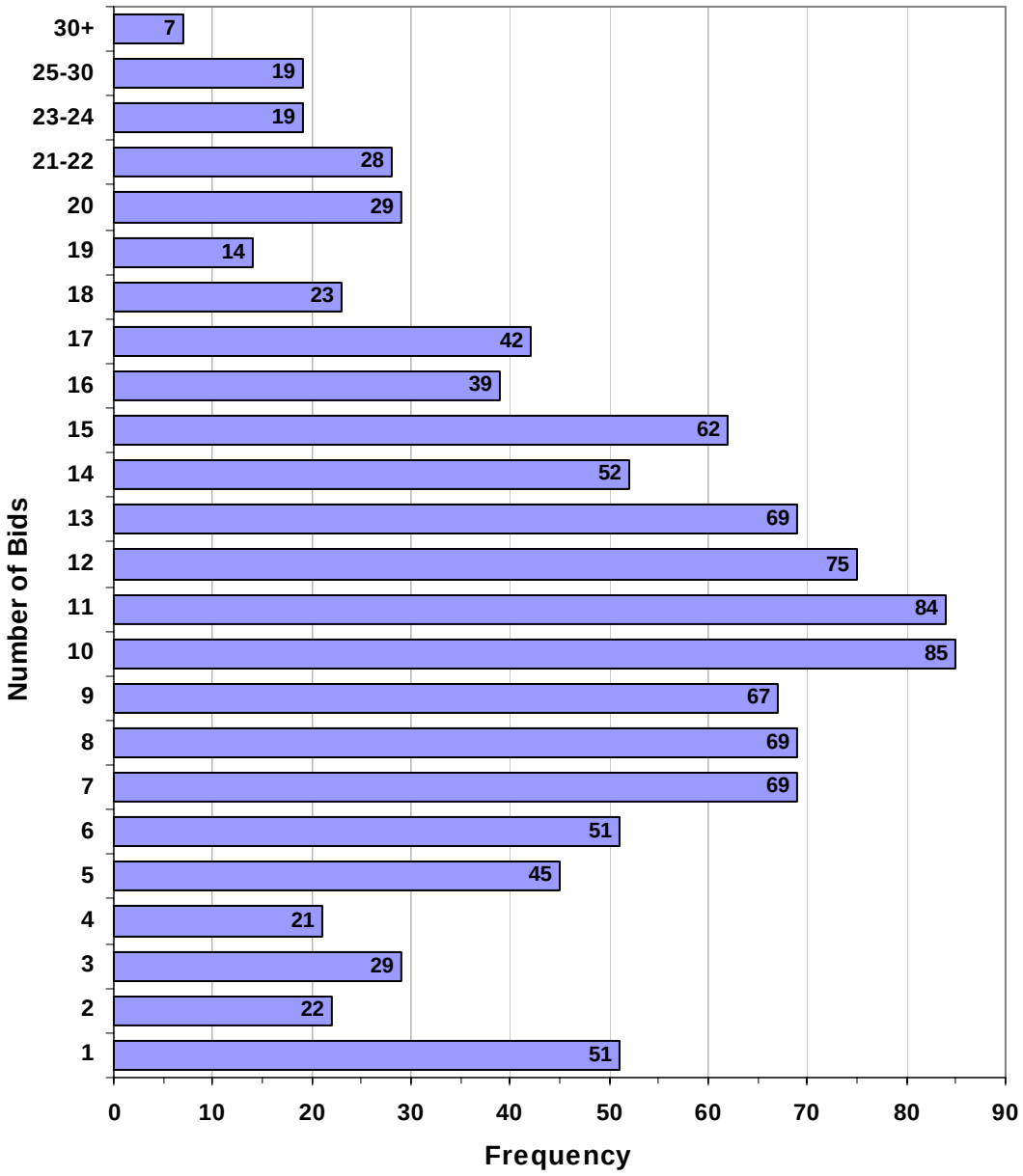


**Figure 5: Number of Bids Received**



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