Investor sentiments and uncertainty on the market for fine wine

Mathieu Cossutta, Philippe Masset, Jean-Philippe Weisskopf[*]

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Abstract

This paper proposes and examines a variety of investor sentiment indicators for the fine wine market. We first estimate wine indices using hammer prices from Acker Merrall. We then suggest some investor sentiment indicators and analyse which can predict the future evolution of wine prices. We especially look at market volatility, liquidity and price estimates.

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[*] Ecole Hôtelière de Lausanne, Le-Chalet-à-Gobet, Case Postale 37, 1000 Lausanne 25, Switzerland. mathieu.cossutta@ehl.ch, philippe.masset@ehl.ch (corresponding author), jean-philippe.weisskopf@ehl.ch

1 Introduction

"Investment-grade", "speculative", "investable", adjectives, which are generally employed for stocks and bonds, are becoming increasingly common when referring to specific wines (mostly from Bordeaux, Burgundy and other renowned wine-growing regions).[1] An increasing number of investors holds wine in their portfolios by investing either directly in bottles and cases or indirectly through wine investment funds. The rapid expansion of wine as an asset class creates new needs in terms of investor information and market analysis tools. For instance, in the UK, the Liv-ex, a now well-established marketplace, not only gives the opportunity to trade fine wine, but also calculates wine indices and conducts market surveys. The success story of this company founded in 1999 demonstrates that investors are avid of such information.

Although these developments are remarkable, this new asset class still suffers from numerous weaknesses. In particular, the determinants of wine price movements remain unclear. Previous studies follow three major directions to isolate factors that help explain wine prices and returns. The first route goes back to work conducted by Ashenfelter who examines wine age and vintage climate to explain wine quality and prices. In several articles (Ashenfelter et al. (1995), (2008)) he finds evidence that wine prices increase for each additional year of age. Wine quality is also strongly impacted by climate with a warm growing season, dry harvesting and rainy winter seasons being ideal. Other studies refine these initial results by analysing the impact of climate warming (Jones and Storchmann (2001)), different wine sales channels (Ashenfelter and Storchmann (2010)) and technological advances (Chevet et al. (2011)) on wine quality.

Other articles examine the impact of expert scores on wine prices, but on average do not find any significant influence. Ashenfelter (2008) based on his previous works suggests that using expert scores might seriously bias the perception of wine quality and that it is not as reliable as weather data. Ashenfelter and Jones (2000) and Haeger and Storchmann (2006) confirm this by not finding that expert opinions contain any additional information that is not available from public sources. Ali and Nauges (2007) and Ali et al. (2008) find a small premium of respectively 1% or 3€ for any additionalParker point given to a wine.

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[1] In general, an investment-grade wine can be defined as a wine that can be traded (either purchased or sold) on a secondary market at a price, which is not systematically lower than on the primary market. For instance, Mouton Cadet (the perfect example of a supermarket wine that can easily be found almost anywhere in the world) and Mouton Rothschild (a first classified growth from Pauillac with a strong reputation) both satisfy the first condition, while only the latter satisfies the second condition.

Other studies turn to economic and financial characteristics to explain the price evolution of wine, but do not find a strong link between both. Sanning et al. (2008) show that wine is unrelated to market risk (as estimated by the CAPM or the Fama-French 3 factor model). Other studies find evidence that wine displays only low correlations with financial markets and thus constitute a good investment to profit from diversification benefits (Masset and Henderson (2010), Fogarty (2006)). However, the volatility of wine returns is not yet completely understood. It is, actually, quite difficult to characterise it due to the lack of liquidity on the wine market. This problem, if not treated appropriately may induce spurious autocorrelation and a severe downward bias when estimating volatility.

In this paper, we propose a different path to study fine wine price evolutions. We use an original dataset that allows us to infer a variety of investor sentiment indicators that are specific to the wine market. We then analyse the relation between these indicators and the rate of return on fine wine. As fine wine does not produce any cash-flows only pure offer and demand is determinant for wine prices. This makes investor sentiment and tis analysis even more interesting. Our objective is twofold. First, we want to gain a better understanding of the functioning of the wine market. More specifically, we assess if investor sentiments are related to wine price changes and how both might interact (e.g. do sentiments lead or lag price changes). Second, we aim at providing investors with new analysis tools that should ultimately help them to understand and anticipate market behaviour. A recent quote by Liv-ex director James Miles illustrates the potential importance of investor sentiments on wine financial performance. "Although the Liv-ex 100 fell slightly in October, the predictions from our members highlight that market sentiment remains positive" (reported by wine-searcher.com). It thus seems that market participants do believe in sentiments to evaluate the fine wine market.

Talking about market sentiments it thus appears important to look at all market participants and their behaviour in the context of wine auctions. We can define three types of major participants. First, the buyers that are the most important actors and who throught their purchase decisions will establish prices. They will have a direct impact on wine prices, their fluctuations (risk) and on liquidity. Second, the vendors will have an only implicit presence by putting wines on the market for sale. Finally, auction houses will play the role of intermediary between buyers and sellers and will have an incentive to maximise transaction prices and volumes. They will also be able to send signals to the market via their price estimates.

This paper contributes to our understanding of the wine market in several ways. We have a new unique dataset that covers auctions by Acker Merrall & Condit for the period 2009 to 2012 that coincides with a boom and bust period. This dataset is deemed interesting for several reasons. First, it gives us access to new price information from an additional, so far never used, auction house. Second, it constitutes data from one auction house but on two major wine markets through Acker's auctions in New York and Hong Kong. Third, it enables us to gain access to Acker's price estimates. To the best of our knowledge this is also the very first study that analyses the relation between investor sentiments and wine returns. Hence, from a wine economics perspective, this paper contributes to expanding our knowledge on the functioning of the wine market. From a broader economics perspective, we believe that this paper contributes to the growing literature on behavioural economics.

The remainder of this paper is structured as follows: Section 2 gives a brief overview of the data and methodology while section 3 shows main results on wine sentiment indicators. The paper ends with conclusions in section 4.

2 Data and methodology

2.1 Sample composition

Our dataset is provided by Acker Merrall & Condit and covers the period February 2009 to June 2012 with approximately 25'000 auctioned lots over 52 auctions and a total turnover of USD 131 million. More specifically, we have information about both pre-auction price estimates and all hammer prices. Hence we are not only able to estimate wine indices, but also to analyse the relation between price estimates and realised hammer prices. Moreover, price estimates may provide an alternative way to estimate the degree of uncertainty on the wine market. This dataset also offers us the opportunity to assess whether such price estimates are informative and to test if they lead or lag realised hammer prices.

2.2 Data preparation

The first step is to control the dataset for errors and inconsistencies. Examples of such errors include: (i) wrong bottle size classification, (ii) typos in the hammer price or in the number of bottles sold, (iii) spelling mistakes. These mistakes not only complicate the classification of the wines, but may also lead to severe biases in the estimated index levels. As

often as possible, errors are corrected rather than removed, in order to keep the maximum amount of information.

Acker Merrall as most other auction houses auctions lots comprising different wines, which have to be discarded due to a lack of individual information, specifically on pricing and estimates. The purpose of this paper being to construct wine indices and to analyse investor sentiment indicators, wines used must show a minimal market depth and liquidity. For this reason, we only keep post-1974 vintages. Excluding these vintages limits potential problems due to a quality bias (e.g. label and level), which are typically difficult to control for and would in most cases have dropped out with the use of repeat-sales-regressions due to unique transactions. Extremely uncommon bottle sizes and anything larger than double magnums are also excluded. Such bottle sizes often trigger a premium that is difficult to estimate due to the limited number of transactions involved. We are studying red Bordeaux and Burgundy as two distinctive wine regions. Bordeaux is further divided into wines from the left or right bank. We also specifically analyse wines that are categorised as First growths from the Médoc and First growth equivalents from the right bank. In a last step we look at super seconds wines, second wines and those from the Lafite family (Lafite Rothschild and Carruades de Lafite).

2.3   Index construction

In the present paper, we use the RSR method due to its advantage for dealing with two key specificities of the wine market: (i) the heterogeneity of the "assets" traded, and (ii) the overall lack of liquidity of the wine market. All the different wines traded at auctions emanate from different regions, producers and vintages and as such are not directly comparable. When calculating an index, this heterogeneity has to be controlled for. The RSR is easy to apply in this respect as it does not require an explicit identification of all wine price determinants as bottles from the same vintage and producer are compared across time. In addition to this heterogeneity, the infrequent trading of most wines must be accounted for. Sometimes it takes years in-between two subsequent trades of the same wine. On this dimension, the RSR approach also performs well. The main drawback of the RSR is sample reduction, due to the fact that a wine must be traded at least twice over the period in order to be taken into account. However, the relatively large amount of a specific wine-vintage pair, as compared to other collectibles such as paintings or jewellery, mostly circumvents this problem.

The RSR approach, as its name suggests, is based on repeated transactions of the same wine. In order to illustrate the approach, let's consider a simple example: a bottle of Château

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Lafite-Rothschild 1989 sells at the July 2009 auction for a price of USD 562 and then again in December 2009 for a price of USD 791. Between July and December 2009, four other auctions occurred, but not a single bottle of Château Lafite-Rothschild 1989 has been traded. The aforementioned values correspond to a return of 41% over a 5 month period. The basic idea underlying this approach is to assume that this observed return is due to the evolution of a reference wine index plus an unexpected innovation term:

$$r_{i(t_1,t_2)} = r_{I(t_1,t_2)} + \varepsilon_{i(t_1,t_2)} \tag{1}$$

where $r_{i(t_1,t_2)}$ corresponds to the return of wine i (in this example, Château Lafite-Rothschild 1989) between auctions t_1 and t_2 and $r_{I(t_1,t_2)}$ is the return of the reference index over the same period of time; $\varepsilon_{i(t_1,t_2)}$ is an innovation term.

Using continuous returns, one can further rewrite the returns on both wine i and index I from expression (1) as:

$$r_{i(t_1,t_2)} = \log(P_{i(t_2)}) - \log(P_{i(t_1)}) \tag{2a}$$
$$r_{I(t_1,t_2)} = \log(P_{I(t_2)}) - \log(P_{I(t_1)}) \tag{2b}$$

Merging equations (1) with (2a-2b) leads to the following expression for the return of wine i in the period between auctions t_1 and t_2:

$$r_{i(t_1,t_2)} = \log(P_{I(t_2)}) - \log(P_{I(t_1)}) + \varepsilon_{i(t_1,t_2)}. \tag{3}$$

In (3), two unknowns, $P_{I(t_1)}$ and $P_{I(t_2)}$ appear. For ease of presentation, let's replace them with $P_{I(t_1)} = \theta_7$ and $P_{I(t_2)} = \theta_{12}$ (as July 2009 and December 2009 correspond to the dates of the 7th and 12rd auction in our sample). The goal of the whole RSR procedure is to estimate the θ_t coefficients for $t = 1, ..., T$; with $t = 1$ and $t = T$ corresponding to the first and last auction dates. We arrive at the following expression for $r_{i(t_1,t_2)}$,

$$r_{i(t_1,t_2)} = D_7\theta_7 + D_{12}\theta_{12} + \varepsilon_{i(t_1,t_2)}, \tag{4}$$

where D_7 and D_{12} are dummy variables that take values $D_7 = -1$ and $D_{12} = 1$ respectively. So far we have only considered one return on one specific wine. Let's consider a

generalized version of (4) that takes into account the returns calculated from all the repeat-sales recorded within our sample,

$$r_{i(t_1,t_2)} = \sum_{t=1}^{T} D_t \theta_t + \varepsilon_{i(t_1,t_2)} \tag{5}$$

with,

$$D_t = \begin{cases} -1 & if \ t = t_1 \\ 1 & if \ t = t_2 \\ 0 & otherwise \end{cases} \tag{6}$$

The estimation of regression model (5) can be done by Ordinary Least Squares (OLS).

The RSR method as presented so far was first used for calculations of real-estate returns. The well-known Case-Shiller Home Prices Indices are calculated using this approach but the estimation is done using Generalized Least Squares (GLS), instead of OLS (Case and Shiller (1989)). Wine researchers have also applied this method to assess the profitability of wine investments (see Burton and Jacobsen (2001) or Masset and Weisskopf (2010)). The main advantage of this approach is that it controls for all characteristics of a wine, since transactions of the exact same wine are being analysed.

2.4 Investor sentiment variables

As described above we find three major actors on the auctioned wine market; buyers, sellers and auction houses. Each will have a particular impact on different market variables.

Buyers will, through their demand, push prices higher which will lead to positive returns. If their expectations are based on past data then we can also expect prices to be higher than estimates issued by auction houses. This optimism should in turn lead to a higher feeling of certainty and thus to a lower volatility. This should also lead to wines selling more easily which should be reflected by a smaller amount of unsold lots.

Sellers will have a behaviour that is more difficult to forecast. During boom periods they will either have the possibility to sell immediately or to wait for prices to further increase if they are very optimistic and willing to extract the maximal rent out of their positions. Their behaviour will probably depend on past returns with a series of positive past returns leading to a higher probability to sell wile a recent bearish period will make them wait a bit more before selling their positions.

Auction houses will send out signals via their price estimates, but will be bound by a potential loss in credibility and reputation if estimates are perceived as consistently over-optimistic or pessimistic. We can therefore await gradually increasing estimates instead of large price hikes. On the other side, even if the auction house is pessimistic it will hesitate to send a negative message to other market participants by reducing considerably estimates. It will thus rather decrease its estimates at the latest possible moment and in a slow way.

Based on these general observations we define three large categories of investor sentiment indicators. First, we study market uncertainty by looking at price volatility. Second, we look at variables that can be related to market liquidity. These essentially encompass unsold lots or sales volumes. Finally, we examine realised prices and their estimates by looking at their evolution and their accuracy.

3 Results

3.1 Evolution and volatility of the wine market

Our sample period encompasses a boom period from 2009 to mid-2011. This strong increase in wine prices was followed by a decline which lasted well into 2012. Figure 1 shows the evolution for these wine prices for the different sub-categories examined and the S&P 500.

Figure 1: Evolution of the market for fine wine
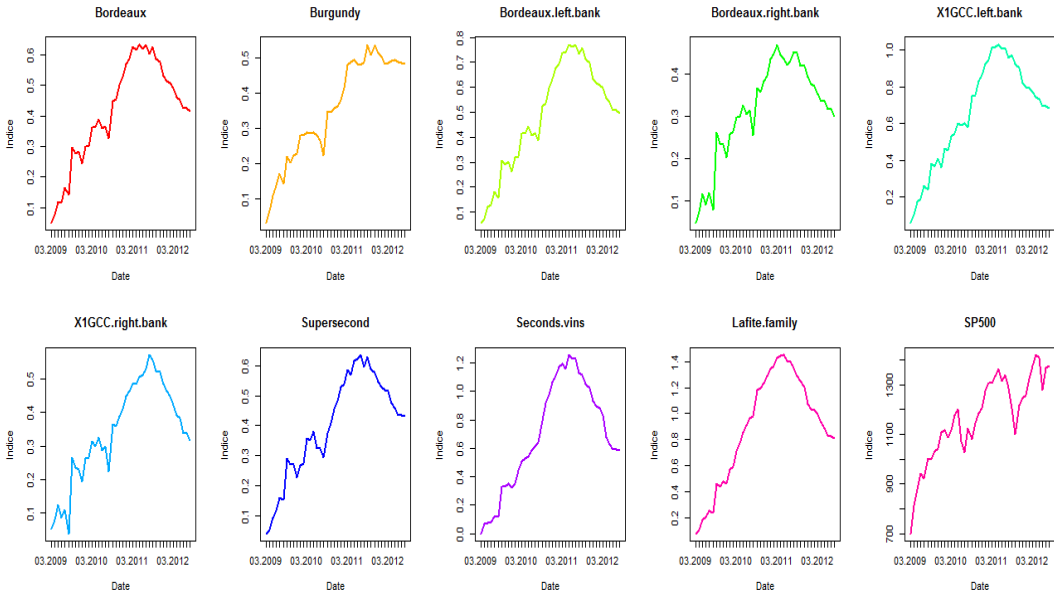
The evolution of all Bordeaux categories is similar with a steep increase until mid-2011 with wines from the left bank and especially second wines and Lafite wines more than doubling in price. This was followed by an important decline of -50% from there onwards. Only wine from Burgundy displays a different evolution with strongly increasing prices that remain quite constant at a very high level at the end of the sample period. At the same time the S&P500 also showed a high increase as stock markets have been recovering since March 2009 to reach new all-time highs in recent weeks.

Table 1: Market evolution and volatility

	Bordeaux	Left bank	Right bank	First growths left bank	First growths right bank	Super-seconds	Second wines	Lafite family	Burgundy	SP500
Average	8.36%	9.73%	6.79%	10.74%	7.40%	8.71%	15.19%	15.26%	11.23%	16.82%
Volatility	7.77%	8.56%	7.32%	9.11%	8.89%	8.15%	12.86%	11.50%	5.61%	20.88%
Turning date	23.05.2011	27.05.2011	12.05.2011	03.05.2011	26.08.2011	01.07.2011	09.06.2011	16.04.2011		
Volatility Boom	7.27%	7.77%	7.72%	7.70%	8.79%	8.07%	9.95%	9.29%		
Volatility Bear	4.47%	5.25%	3.63%	5.06%	5.04%	4.54%	8.04%	6.17%		

Table 1 shows the evolution and volatility on the market for fine wine and for the S&P500. As can be seen stock markets performed extremely well during the sample period but were also quite risky. Wine on the other side performed less well, but also displayed a much lower volatility. The low risk of wine investments has already been highlighted in academic and practitioner's articles and is often seen as a major benefit in investing in wine. In a second step, we calculated turning points[2] for the different wine indices. Through the use of an algorithm we looked at the date when wine markets turned form a boom period into a bear period. For most cases this was achieved during May 2011 as can also be seen in figure 1. As becomes apparent the volatility on the wine market does not follow classic financial theory that predicts that in times of market turmoil risk increases due to increased uncertainty on the future of the markets. For wines, volatility seems to behave inversely. In boom times risk is higher than in times of market downturns. During the wine boom period more noise traders in form of individual, non-professional traders were present on the market. These rather less informed traders would create additional noise on the market and thus increase uncertainty on

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[2] We, unfortunately, were not able to calculate turning points for Burgundy and the S&P500 as both indices do not really display a true switch from bull to bear periods. Especially for Burgundy, prices did not drop over the sample period.

it. When markets turned down these traders disappeared form auctions and left place to market professionals.

3.2   Market liquidity

In a first step, we analyse unsold lots for both regions and the different sub-categories. As can be seen in Figure 2 unsold lots vary across categories, however, during boom times unsold lots are rarer than during the price declines in 2011/12. Most markedly it is wines from the left bank that have the highest variability in unsold lots. Here especially it is second wines and those from Lafite that were very easy to sell over the period 2009-2011. These two categories displayed nearly 0% unsold lots. However, when the prices started to fall during 2011 these were also the two categories that exhibited the highest rate of unsold lots with second wines reaching a level of 50% and the Lafite estate 25% of unsold lots.
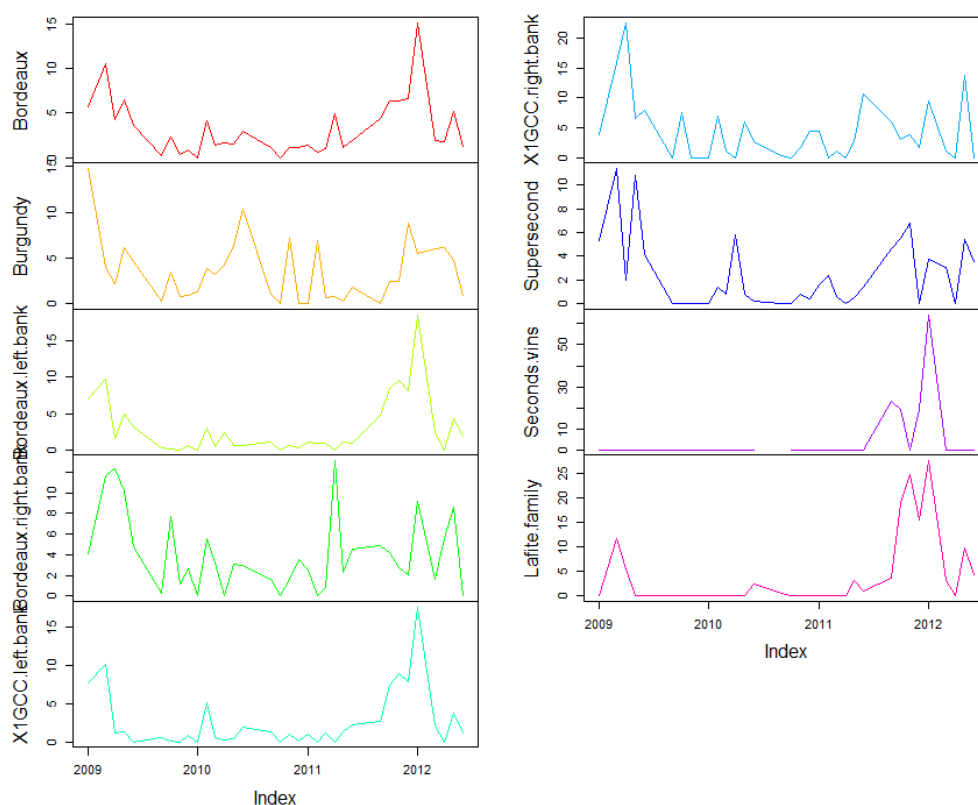
Figure 2: Percentage of unsold lots

Figure 3 shows the evolution of volumes (coloured lines) and prices (black lines) of wines traded at Acker auction over the period. It seems that for most categories falling volumes

represent a lead indicator on falling wine prices. The notable exception is Burgundy for which prices and volumes do not seem to drop too much. In rising markets, however, the tendency reverses with volumes lagging price changes.

Figure 3: Evolution of wine volumes and prices
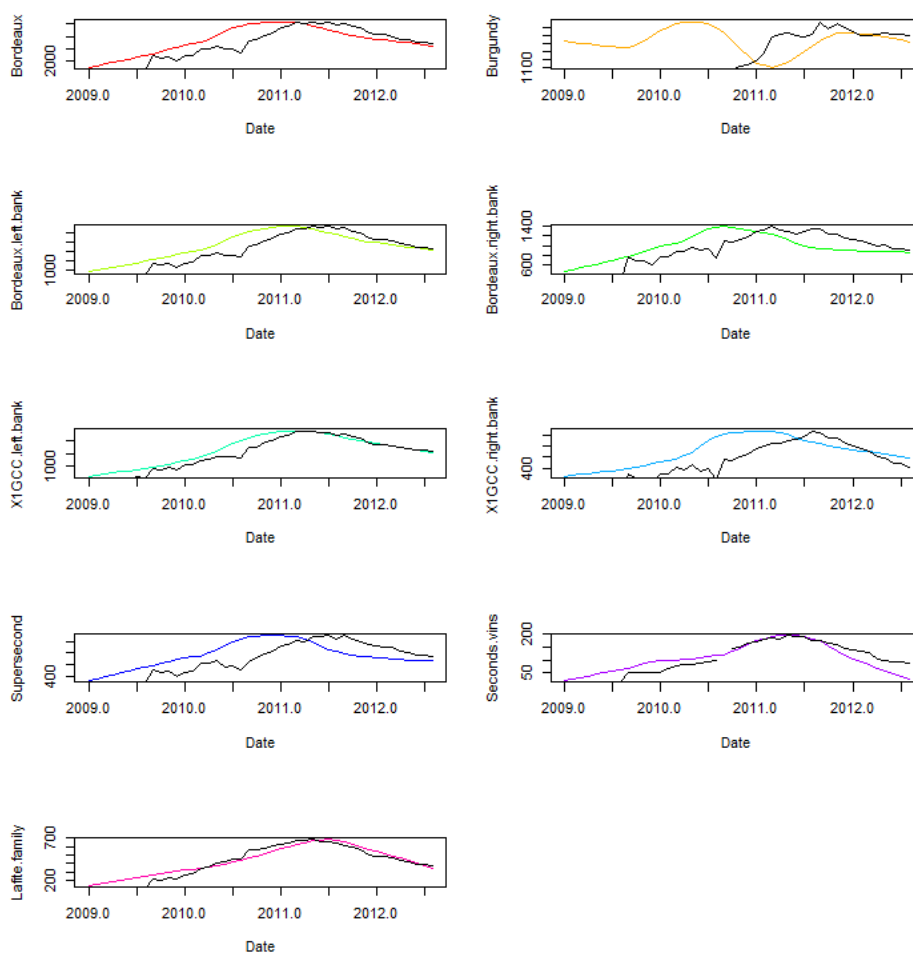
Results suggest that in declining markets participants start selling less wine the lower prices get. In case of increasing demand prices go up and once market participants have realised things go well they put more and more wine on the market. The high volumes during the boom period can be interpreted as an over-valuation or exuberance by wine investors (Baker and Stein (2004)). In a market on which short-selling and the use of derivatives is not possible or forbidden small investors are more likely to participate if optimism reigns which will lead to higher trading volumes and liquidity. On the other side, during pessimistic times these traders will refrain as they are not able to bet on falling prices.

In figure 4, we are analysing differences in volumes on the Hong Kong and New York auction market. Interestingly, it seems that volumes fell and staid low on the Hong Kong market in 2011/12. Especially the most sought after wines in Hong Kong from Lafite got most hit and have not recovered yet. Burgundy displayed a lower decline which seems to coincide with the up-picking and increased interest in Burgundy wine on the Asian market.

Figure 4: Volumes on the Hong Kong market
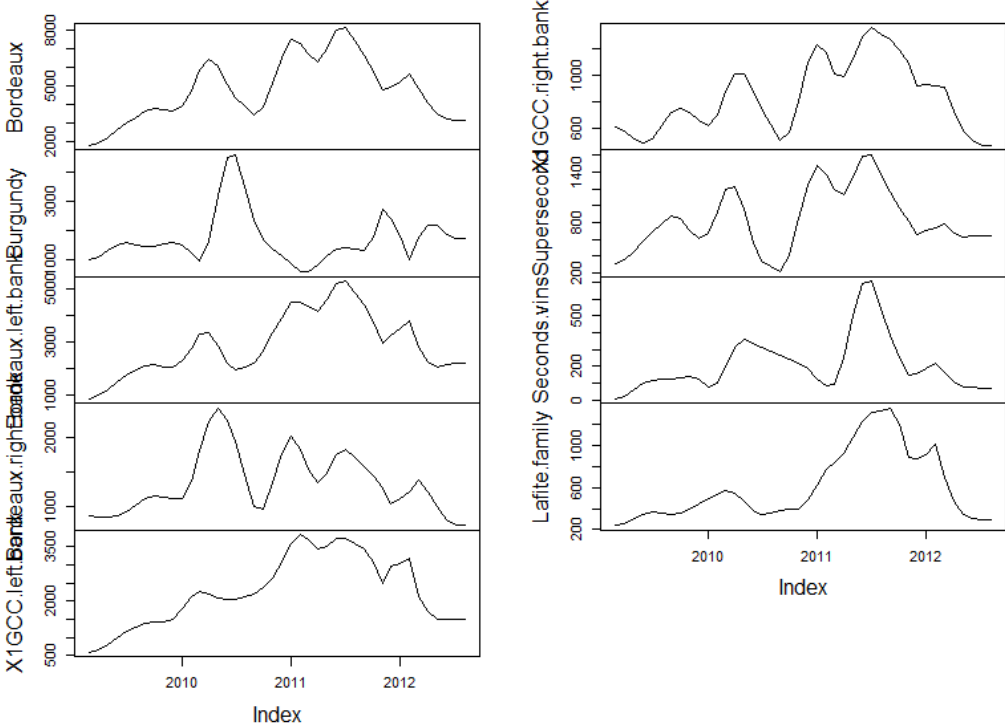
On the US market volumes also dropped significantly in 2011/12. However, in contrast to Hong Kong these started to slowly pick up again at the end of the sample period. Moreover, volumes stay at higher levels in Hong Kong which confirms a gradual shift from the US market towards sales in Hong Kong for fine wine. This evidence suggests that the wine market is segmented and that investors will ship their wines to the market place potentially offering the best returns.

Figure 5: Volumes on the New York market
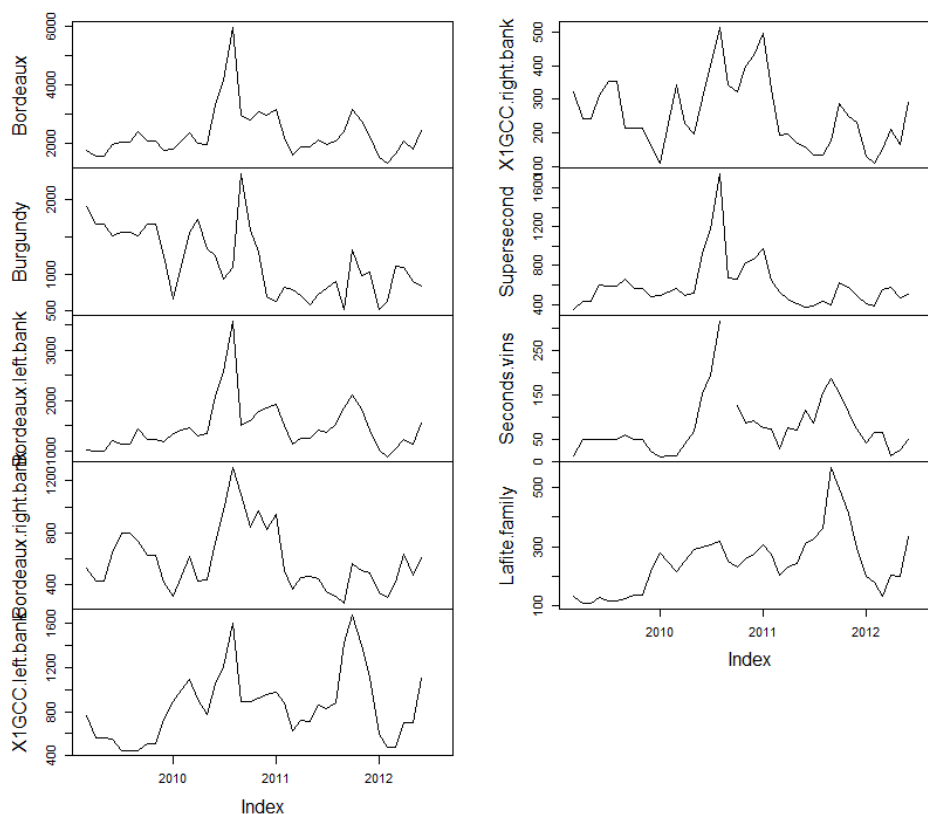
3.3 Realised and estimated wine prices

Auction houses issue low and high price estimates before auctions. These estimates should have an important impact on the decision to buy wines at an auction and serve as a guideline to prices that one will have to pay. At the same time it allows the auction house to give out indications on the wine market which can be used by all other participants. Auction houses should try to estimate the upcoming auction prices the best possible. Figure 6 shows interesting properties concerning prices and estimates. Estimates seem to lag the price evolution. It also seems that estimates are much more smoothed and do not display any hikes in their evolution. This indicates that auction houses are reluctant to change price estimates too fast and especially during downturns wait to adjust their estimates. This shows that auction houses do not want to add additional bad news on the market that might increase downward spiralling prices.

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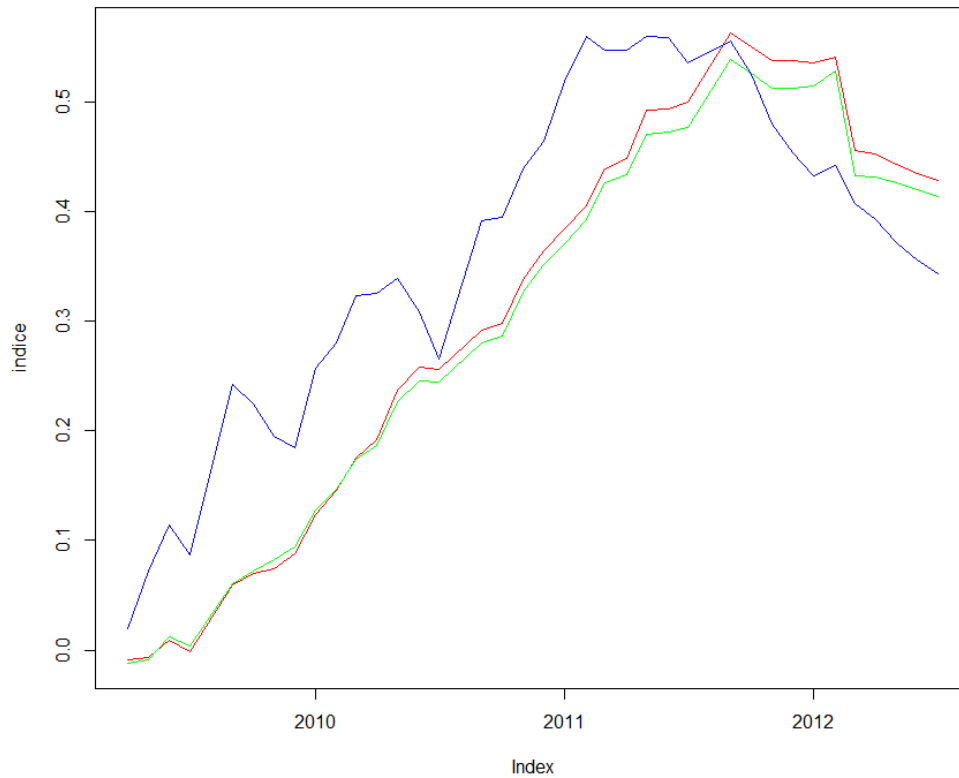**Figure 6: Price, low and high estimate indices on the wine market**

Table 2 again looks at turning points between bullish and bear periods. Results confirm the visual interpretation of Figure 6 in that price estimates tend to change directions approximately 4-5 months after wine prices have dropped.

Table 2: Turning points wine prices and estimates

|	Bordeaux	Left bank	Right bank	First growths left bank	First growths right bank	Super-seconds	Second wines	Lafite family
Price index	23.05.2011	27.05.2011	12.05.2011	03.05.2011	26.08.2011	01.07.2011	09.06.2011	16.04.2011
Estimates index	11.10.2011	10.10.2011	21.09.2011	20.09.2011	17.10.2011	08.10.2011	01.11.2011	17.08.2011

It also appears that in times for which the market displays turns in price evolutions the index for the low and high estimate are further apart that hints at an increase in estimate spreads and an increase in uncertainty on future auction prices. Regression results in table 3 confirm the observation. The spread tends to increase when prices fall across all wine categories.

Table 3: Price and Estimate spreads on the wine market

|					High-low Estimate Spread				
	Bordeaux	**Burgundy**	**Left bank**	**Right bank**	**First growths left bank**	**First growths right bank**	**Super-seconds**	**Second wines**	**Lafite family**
Intercept	0.299	0.305	0.299	0.300	0.304	0.301	0.292	0.297	0.303
	155.75***	120.56***	151.33***	149.29***	130.61***	114.67***	146.07***	109.30***	127.08***
Price index	-0.288	-0.455	-0.239	-0.327	-0.290	-0.284	-0.244	-0.220	-0.173
	-3.48***	-3.34***	-3.11***	-3.52***	-3.42***	-2.81***	-2.97***	-3.14***	-2.55**
Adj. R2	0.21	0.20	0.17	0.22	0.21	0.14	0.16	0.18	0.12
Observations	42	42	42	42	42	42	42	42	42

In a last step we study if price estimates are good predictors of the effective prices at which auction lots are sold. Figure 7 looks at the percentage of lots that are sold at a price that is higher than the high estimate, while figure 8 shows the percentage of lots that go for prices that are lower than the low estimate. As can be seen both are not constant over time which shows that price estimates are adapting over time to better reflect market reality.

Figure 7: Hammer prices and high estimates
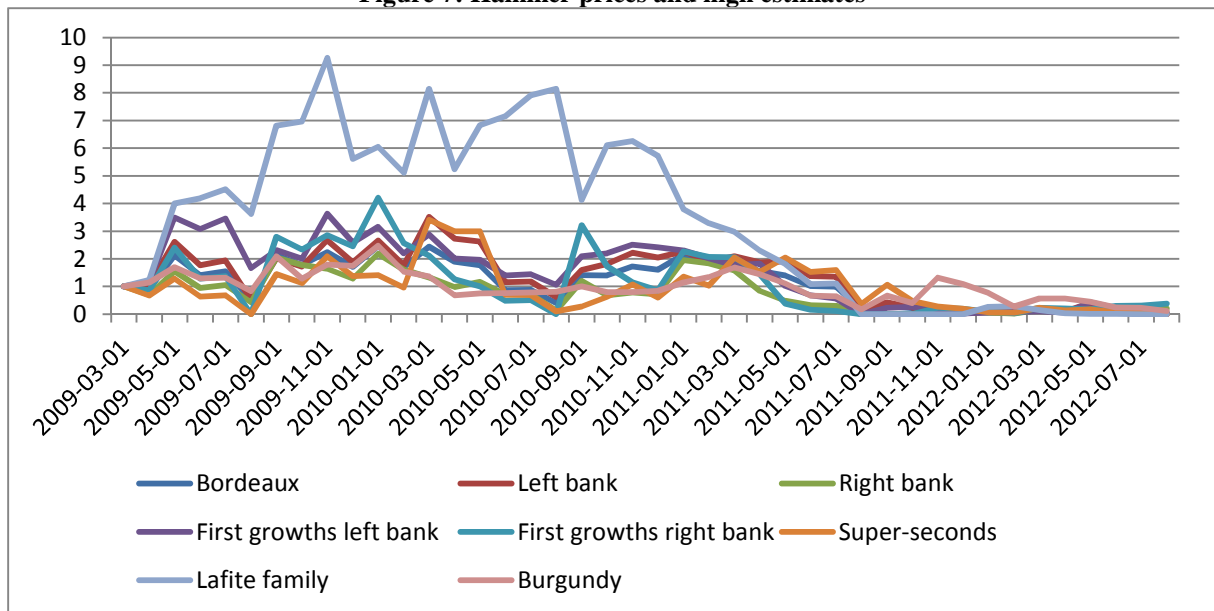
During the boom period lots for the vast majority went for higher prices than the low estimate. This changed from mid-2011 onwards. In this period wine prices significantly dropped and many wines would not even reach low estimates

Figure 8: Hammer prices and low estimates
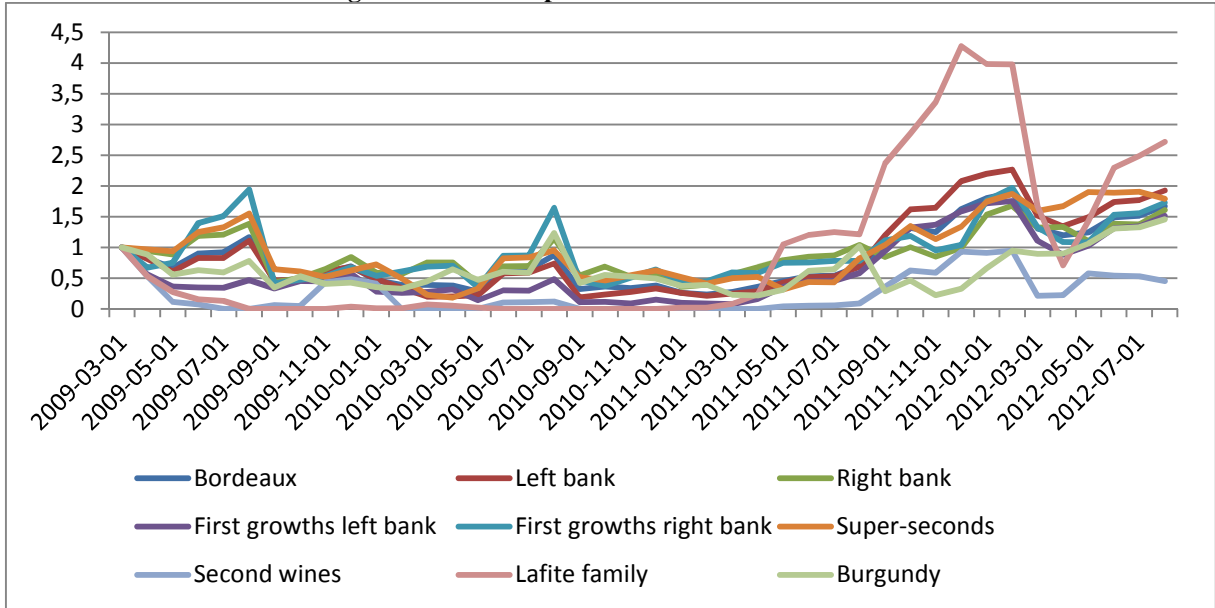
4   Conclusions

This paper looks at investor sentiments on the wine market. We more specifically analyse wine market volatility and liquidity and auction price estimates to gain a better understanding of how these different variables evolve and can be used to better understand the market. Market volatility seems to be very low as compared to company stocks and is higher in bullish periods as compared to bullish times. Market liquidity also evolves across times with an increased number of unsold lots and a lower volume during downturns. Price estimates seem to be smoother and to lag actual prices.

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