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The strategic role of the reserve price in art auctions: an empirical and theoretical analysis

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To my professor Giovanni Ponti, who gave me the chance to work on this study and supported me with advice and indications for its development.

To my parents that always sustained me during these three years and helped me when I doubted about myself.

To all my friends who have always been with me for this three-year adventure.

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1. Introduction

Auctions are amongst the most antique methods to sell items amid a group of people interested in a same object. The auction mechanism has been developed perhaps even by Babylonian civilisation more than 2500 years ago and it has become a very popular and efficient way to sell items in modern times. An auction, according to the Oxford Dictionary of Economics (2009), is defined as "a sale where the price is fixed by an auctioneer who invites bids, and awards the article being auctioned to the highest bid".

A normal auction and an art auction are similar but different for their specific purposes and for the different dynamics that take place.

The main difference to notice between a normal auction and an art auction is that, in the latter, every object for sale has an element of *subjectivity*. Thus, it is difficult to determine a fair appraisal by which set a reserve price. Moreover, the artwork estimates are based on the trading history as well as the normal criteria which are considered for determining a price. This means that the estimates are based on the last price reached during an auction, who was the previous owner, how much has passed from the last time the item has gone for sale and where it has been exhibited in its past. It is clear that these variables influence the reserve price as well as they are linked to the value of the low estimate.

Another compelling variable that has to be taken into account to fully understand an art auction and how it develops regarding the reserve price and the offers is the taste of the buyers. Differently from an auction of industrial components, for instance, in the art market generally there is no consideration of the practical utility of the item for sale. In fact, an artwork tends to do not have any practical function. This means that in determining what the value of the object is, it must be considered whom the audience is made of and what the general taste of the people is. Additionally, the status of the market is a factor that inevitably influences the final price of an artwork. This can be easily explained by considering that there is a mutable trend in the market that affects the various art styles and consequently the pieces of art. However, in case an artwork is bought as an investment, clearly, the dynamics involved are similar to those typical of other investment goods. In this respect, we can say that, for an art auction, the objects for sale have a private value component, associated with the individual tastes of the potential buyers, and a common value component, associated with its potential value in

the secondary market. This makes art auctions very interesting also from the theoretical point of view.

An auction house that wants to sell an artwork must follow the criteria stated above. For instance, the reserve price indeed reflects all the variables that take part into the process of price determination, such as the already cited heterogeneity of the potential buyers and the trading history of the artwork. However, the reserve price is set based normally on the values of the low estimate. It is then clear that this price must take into account the preferences the buyers have about the object along with those of the seller. In fact, as stated above, the preferences of the buyers can be partially deduced by the trading history of the artwork and then define how desirable it is. So, the reserve price in an art auction is meant to be affected by the tastes of the buyers as well as the trading history of the artwork.

As mentioned above, it is important to notice that an auction house decides the amount of the reserve price by taking into account what is the purpose of the audience as well. In fact, in case one is interested into the purchase of a piece of art for trading, he or she will probably be willing to pay it less possible and not being highly determined to purchase it at any cost. By contrast, one who wants to buy an item because he or she is a collector will be highly motivated to purchase the object for sale at any cost. An art collector does not reckon the object for sale through its economic real value, but through his or her personal value, without considering the economic variables involved into the financial value. Evidently, these two different motives to buy profoundly affect the auction house behaviour and then the setting of the reserve price. In order to take the most from each attitude of a potential buyer, the auction house has to set different reserve prices depending if the buyer wants to keep the item for its aesthetical value or for trading it. However, it is important to notice that this kind of information is very difficult to find and, for obvious reasons, potential buyers have no interest in revealing their subjective evaluations of the object at sale. Thus, the auction house is rarely in possess of this information.

The aim of this work is to verify whether auction houses behave as economic theory suggests when setting the reserve prices of the objects they auction off. This is a very delicate aspect of the mechanism design problems auction houses face when organising

an auction, as it involves i) a rough estimate of the potential hammer price and ii) the complex business principal-agent relationship with the seller.

We develop our work along three chapters. In Chapter 2 we define generally the role of the reserve price in a standard auction first and, later, in an art auction specifically. In Chapter 3 we analyse four academic papers used as a basis to fully understand the topic and to generate the key ideas of our original questionnaire. In Chapter 4 we propose a questionnaire to the major Italian and English auction houses in order to test whether they behave differently with respect to what the theory predicts. We purposely avoid to involve the so-called "Big Four" (Sotheby's, Christie's, Bonhams and, Phillips) in our survey as we consider them to be part of a different market than the others. Finally, in Chapter 5 we present our preliminary empirical analysis, showing that there is a discernible difference in behaviour between the Italian and the British auction houses and that auction houses in both Italy and England follow only partially what theory predicts.

Specifically:

1. Our questionnaire highlighted that the theory here proposed is only partially followed by auction houses in the reality because of many variables that inevitably affect the auction and that cannot be disregarded.
2. There are some common decisions that are taken in both Italy and UK regardless of any variable. We consider these as a sort of "general rules" followed by every auction house.
3. The academic papers we presented point out that the diversity each bidder has in terms of purpose and taste, alongside objective variables that characterise the market, are reasons which force auction houses to assume a behaviour that is not always in accordance with the theory proposed.
4. Structural diversities between Italy and UK market generally affect what the strategies considered are, then not only those regarding the diversities among the bidders. This is proved by looking at the behavioural differences we find between Italian and British auction houses.

2. Auctions: a general view in the reserve price perspective

The *reserve* price is a key concept for every economic mechanism, which is not the same as what we define as the reservation price.

We call reservation price the one which is referred to the individual subjectivity.

From the buyer's point of view, the reservation price is defined as the maximum value that he or she is willing to pay to purchase the object at sale. It is evident that for every buyer there is only one reservation price but it can vary depending on the individual. It is then possible to make a microeconomic analysis of the buyer's reservation price in order to determine how his or her preferences behave toward the budget constraint. In fact, as Varian (2010) explains, the reservation price is useful in a market for allocating all the goods among the buyers. In a perfect world, for every object price, there is a buyer willing to purchase it. In this way, it can be determined a Pareto efficient equilibrium as everyone does not want to change his or her status.

From the seller's point of view, the reservation price is defined as the lowest price at which he or she will be willing to sell an object. In this case as well, the seller cannot have more than one reserve price per item but every person might be willing to sell the same object at different prices. Such prices are usually based on personal needs and expectations of the auction result.

Thus, it is evident that the reservation price, regardless the context, is crucial in determining a successful deal between two people with different demands. A trade can result either in a meeting of their needs and then a successful sale or not. The outcome of an auction depends on how much the buyer is willing to pay for the object and the seller is willing to earn from it. It is possible that there will be no trade because of impossibility to embrace both demands of buyers and sellers.

In microeconomic terms, the reservation price is the highest amount of money at which the buyer is willing to pay for buying the item. This price can be expressed considering the utility the buyer has. If it is considered *m* as the endowment, *u* as the utility and *r* as the reservation price the buyer has, it is possible to determine the utility amount through the reservation price and the loss of wealth as follows:

$$u(0,m) = u(1,m-r_1).$$

It is evident from the equation proposed that the reservation price is the boundary where the buyer is both willing to purchase the item and to do not purchase it. Yet, the proposed reasoning takes into account the quantity of the object, which is not compulsorily only one. However, there is still a balance in terms of amount of utility produced by the different choices taken by the buyer. It is possible to rewrite the utility equation, without considering the endowment as the reservation price itself is a monetary representation of the preferences one may have, in order to emphasise the reservation price and to demonstrate what its value in terms of utility, indicated with *v*, is. As follows:

$$r_1 = v\,(1) - v\,(0).$$

It appears that the reservation price is an outcome of a subtraction of two different utility functions. The equation suggests that every reservation price is not to be considered similar to another and that it derives from a theoretical loss of utility for the buyer. However, it is important to say that the reservation price indicates the preferences without taking into account what the budget constraint imposes.

It is important to notice that a similar demonstration is possible only because in this particular case a quasi-linear preference has been shown. The quasi-linear preference is a particular type of preferences which are additive with a linear component. Consequently, every level of indifference curve is a vertical translation of the previous one.

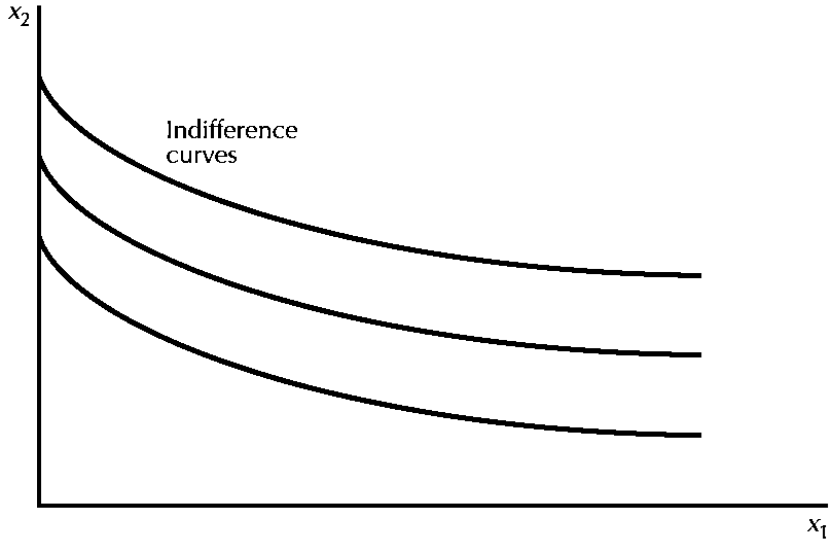


Fig. 2.1.1 Graph of the indifference curves for the quasi-linear preferences (Varian, 2010)

Furthermore, it appears evident that in the proposed equation there is no reference to any budget constraint, nor about the cost for the buyer of a similar purchase. This analysis takes into account only the preferences, although it is expressed in monetary terms.

By contrast, in an auction, the *reserve* price is the minimum level of price reached through the bids. It determines if the item is sold or not. This amount is determined by the seller (in accordance with the auction house) and is usually kept secret to the potential buyers.

What is different between the broad concept of reserve price and its meaning in an auction is that, in an auction mechanism, the reserve price is the discriminant the bidders will consider for awarding the object for sale. They clearly do not know its amount as stated above. This means that buyers will be unsure about the value of the object and if their offer has been high enough. In addition, the reserve price at auction is usually set based on what the pre-sale estimates provided are, particularly on the lower one. Various types of auctions have been created such as the English auction and the Dutch auction that are the most common.

An English auction consists in an ascending price auction made up by an open competition between the bidders. The winning bid is the highest price reached as result of the contention, then when all the other bidders will have given up the competition. Clearly there may be variations to this standard such as a minimal increasing bid.

A Dutch auction is a descending auction characterised by the absence of a bidding fight as it happens in the English one. In this case, the winning bid is the price accepted by a bidder or the reserve price whenever it is reached. In fact, the auctioneer starts the auction from a high price, called ask price, which is lowered during the competition following a descending rate.

A second-price auction (sealed-bid auction) is a particular kind of auction in which the bidder with the highest bid wins the auction and pays the second highest bid. This kind of auction is not widespread but has an interesting implication for our discussion as it will be discussed in the next chapter.

The reserve price occupies a central role among the key determinants of the auction process. It is a price which has to be reached by some bidders in order to achieve a successful purchase. Essentially, the reserve price can be considered as the lower bound between “useless” bids and “useful” ones in order to obtain the object at sale. There are

a number of characteristics and implications that follow the strategy of how to set a reserve price and how to deal with it. In particular, it is known by the terms of the consigning contract that, since the seller usually has a strong influence in setting the reserve price, in case the item going unsold, he or she will be charged of a commission directly calculated as a percentage of the reserve price. This mechanism is meant to prevent the seller to set an unrealistic reserve price for the object at sale, then avoid to head for unsuccessful sale. Notice that this fee is not the component of a "real profit" for the auction house, given that the total cost for the unsuccessful sale are higher than it is usually covered by the amount paid by the seller.

The amount of the reserve price is usually kept secret to potential buyers despite the key role it plays in the auction. However, it is important to say that almost every auction house takes note in the pre-sale catalogues of the presence of the reserve price on each object at sale. Such information is usually provided with a key sign next to the name of the object. This signal shapes the buyers' behaviour they have in offering for each item at sale. The secrecy of the reserve price is the only variable on which an auction house has preferential information and through which it can drive the auction possibly to a certain result. Bidders cannot know if they have effectively achieved a successful sale because of its secrecy. It is customary that the winning bidder knows when the auction is ended if he or she have met the reserve price with his offer. There is still no agreement on the reason why auction houses tend to do so. A consequence of keeping the reserve price value secret is that bidders are much more competitive among them for the presence of a similar uncertainty (see Vincent, 1995). A similar consequence is the direct effect of the microeconomic value of the reserve price. This will be further discussed in the next section. In fact, a buyer will be more willing to bid for an object rather than let it be bought by someone else if he or she does not know whether the bid was enough or not.

2.1 Evidence about art auctions from previous studies

There have been studies aimed at analysing what are the consequences of a secret reserve price. Vincent (1995) finds that keeping the reserve price secret is a way of restoring the linkage between the price paid and the value of the object. The restoration of such correlation is obtained by enlisting greater participation in the auction and,

therefore, increasing the profits of the seller. In fact, when relevant information becomes public, the seller can increase the average bid. Clearly, whenever the average bid is higher, a bidder is more willing to offer for the object for sale as the momentum increases. However, in case of an announced reserve price amount, which may be above the valuation of some potential buyers, it would make them eventually walk away. Vincent (1995) models the auction as a Bayesan game (i.e., both buyers and seller's types are variably allocated with random characteristics). As a result, "the announcement of a reserve price may inhibit the ability of the auction mechanism to aggregate information about other bidders, thus lowering the expected revenues". It is clear that there is a valid reason in keeping more people possible at auction, increasing in this way the chance to sell the objects. However, it is necessary to notice that keeping the reserve price secret can even bring the auction house to assure a certain result at sale by *taking bids off the wall*, as it will be discussed further. In fact, the auction house can be sure that the item will fetch a certain price instead of being bought-in by accepting fake bids.

Several academic studies, such as Milgrom and Weber (1982) and Ashenfelter (1989), have analysed how the reserve price affects the whole experience of the sale and consequently how the auction houses can take advantage of it to increment their profits. One of the most important point regarding the setting of a reserve price is indeed why there is need to set it on a sale of an object. The reason for such need is the *maximisation of the expected profit*, as we explain below. Furthermore, evidence proposed by Varian (2010) have proved that the reserve price is strictly linked to the beliefs the seller has about buyer's evaluations of the object and, then, its determination.

To clarify this last statement, it can be considered what Varian (2010) write in this regard. In his example, he supposes that there are only two buyers, with evaluations for the object which are either 10$ or 100$ with the same likelihood. There is then a set of four total possible forms the buyers' preferences can be: (10,10), (10,100), (100,10), (100,100). If it is assumed that ties are resolved by the flipping of a coin and that the minimum bid increment is of 1$, it is then possible to determine which will be the expected revenue the auction house will achieve. The winning bids in all the four cases are in fact 10, 11, 11, and 100. These values are the calculated taking into account the minimum increment combined with the evaluation of each buyer. It is now possible to determine what the expected revenue for the auction house will be. It is possible to

establish that the expected revenue will be $\frac{10+11+11+100}{4} = 33\$$. However, there is a way to perform better than what demonstrated, based on the data provided. In fact, if the auction house set a reservation price, the expected revenue can further increase. With a reserve price of 100 the expected revenue will growth compared to above: $\frac{0+100+100+100}{4} = 75\$$. It appears evident then how the reservation price makes the auction house better off. However, it must be noticed that this is not Pareto efficient since, in one case, the item will go unsold. Furthermore, setting a reserve price will cancel any profit on the buyer's side, making him considerably worse off. Lastly, 100$ is the maximum reserve price amount possible in this example. Lower amounts are possible, nevertheless the profit will not be maximised through higher values but only increased.

It has been shown that the reserve price is a crucial element in determining the auction dynamics and consequently the auction house potential profits. If the reserve price is met, the seller will pay the so called "hummer price", the amount of which is derived by the value of the winning bid added of a percentage of fees to remunerate the auction house. By this reason, it is clear that an auction house will have interest in sell the item at any cost, in order to gain a revenue. Thus, an auction house would presumably be willing to set a low reserve price that can assure sale for certain.

There are several implications regarding the discussion about the secrecy of the reserve price. One of the most important questions is whether the auction house set an unprejudiced reserve price, acting honestly towards the seller. Indeed, it might happen that the auction house sets a reserve price which is lower than it would have been otherwise. In fact, setting the right reserve price is crucial for meeting it and fetch a good result at the auction; for this reason, it has been considered one of the main drivers of a successful auction. However, it has been said that also the seller contributes in the decision of the amount of the reserve price. Likewise, it cannot be unbound from the estimates provided as they are meant to be a reasonable interval where it is likely the hummer price to be into. It is clear that the two variables are strictly connected and actually interdependent. Any variance in this relation leads to a big variability in sale rates, providing a quantity of signals that play a large role in public discussions of the current state of the art market. These rumours are crucial in a successful sale and for a low buy-in level. Thus, given to a low and high estimates set as stated before, a right

reserve price could determine the result of the auction and for sure it cannot be let decided either by the seller or by the auction house only.

Ashenfelter and Graddy (2010) analyse the implications of the reserve price level and how it affects the result of the auction, through a regression on a dataset. They demonstrate that "sale rates have shown no discernible trend or consistent correlations with current price levels, but that sale rates and *unexpected price movements* have a strong visible relationship, despite the efforts of auctioneers to produce accurate estimates". They also prove that the reserve price is to be set at approximately 70% of the low estimate in order to fight in a certain way unexpected price movements and achieve a successful sale.

Yet regarding the estimates provided by the auction house about an artwork, Bauwens and Ginsburg (2000) clearly highlight that these estimates are significantly biased despite the biasness being rather small. It is also important to say that they show that making better use of the information could lead to a lower biasedness. In particular, they prove that Sotheby's overestimates low prices and underestimates high ones, whereas Christie's has a more systematic tendency to undervalue. The more plausible reason proposed for such tendency is that auction houses apply this policy in order to make items more attractive. This result goes somehow against what remarkably stated by Ashenfelter (1989) who says that "the auctioneer's price estimates are far better predictors of the prices fetched than any hedonic price function". In fact, he analysed the auctioneer's behaviour and supposed that auction house were truthful in the appraising of the item and in setting the reserve price.

It is evident that, if the estimates are biased, the reserve price will be affected and the whole sale will be compromised. Ashenfelter and Graddy (2003) study the role of the experts in the outlining of the low and high estimates. In fact, classically auction houses were considered truthful over the estimation, then setting a right reserve price and obtaining a fair profit. In the reality estimates are biased. One reason proposed is that experts are not so efficient in estimating reasonable and fair boundaries for the price. Another observation is that auctioneers could engage a systematic manipulation of the high and low estimates for strategic purposes, then implying an alteration of the reserve price. This manipulation can also be considered as a direct consequence of the setting

of a certain type of reserve price. Indeed, in the case of a rather known item that goes well beyond the high estimate during the sale, the auction house will have a good return of image from it. It is clear then how the reserve price can be even seen as a marketing driver for these institutions.

However, a smaller gap between low and high estimation is obtainable when the seller wants to applicate a higher reserve price even if it is positively correlated to a higher buy-in rate. It is essential to say that the reserve price is always susceptible of change despite of what just said. In fact, the auction house usually set a confidential reserve price with the agreement of the seller. Instead, in certain circumstances, this habit could change with regard to the quantity and the value of the object consigned, then allowing the seller to decide it by his or her own. This last statement is to be considered as an exception of what stated above about who determines the reserve price.

An uninformed seller may be defrauded by the auction house in the appraising process of a piece of art. Indeed, the potential seller may receive a lower estimate for his or her artwork rather than its real value. The asymmetric information issue is deeply studied by Akerlof (1970). He proposes an example called “the market for lemon”, in which an asymmetric information problem leaves the market of used cars only with defective ones. A comparison between the market lemon and the art auctions is possible as in the last case there could be an unfair behaviour of the auction houses, generating lower prices for the sellers. This issue is indeed very consistent in art auctions, where there is not always a complete awareness of the real value of the piece for sale.

Given to the direct consequences the estimates have toward the reserve price and the sale, it is crucial to be mentioned the presence of a legal cover in both New York and London, where the most important auctions in terms of value and quantity take place. In USA is present the Uniform Standards of Professional Appraisal Practice (USPAP), which is a quality control standard for real estate, then extendable also to pieces of art at auctions as they are treated as proper real estates. Likewise, in UK is present the Misrepresentation Act (1967) that prevents auction houses from commit an abuse in the appraising of the object at sale, taking advantage of an unaware seller. These two legal covers operate *ex-post* and *ex-ante* respectively. A similar security provided by the law

blocks in a certain way the range of possible actions the auction houses can take concerning the misrepresentation of the item at sale for their own purposes.

In some cases, auction houses are committed to the seller that he or she will receive his expected revenue even though the auction ends up with his or her item unsold. This result can be obtained only through the introduction of guarantees. Auction houses are willing to bear a similar financial risk only for big consignments in terms of value and quantity. The auction house that assures a guarantee to a seller, has interest to pursue at least a sale because it has to cover the guarantee costs and possibly to make a profit. However, some of the major auction houses like Sotheby's or Christie's have introduced a third part guarantee. This instrument has been introduced in order to avoid auction houses to be so dramatically exposed to the risks that inevitably characterise the guarantees at auction (particularly evident when a very high value artwork or collection is dealt). The auction houses can attract with a similar mechanism more people to sell object through them, incurring in lower financial risk than it would be otherwise.

It is interesting to notice how Graddy and Hamilton (2014) demonstrates that a guarantee does not seem to influence the final price once the value of the item is considered. It is also proved that auction houses are unlikely to modify the value of the estimates for guaranteed items. In fact, the method used for producing appraises is unbiased in the proposed analysis. However, is it proved that such guarantees act as a positive signal for the item, attracting more potential buyers. There are advantages for each side since there is a third external part which bears the economic risk correlated. This third part charges another fee to the seller in order to ensure him or her the required amount.

However, the implications about the commissions are not as easy as they appear. There have been studies that expressly analyse what the consequences are, for instance, in combining buy-in penalties with commissions at auction houses
Greenleaf and Sinha (1996) in particular study what the consequences are in combining the buy-in penalties with guarantees. What comes out is that a strategy which contemplates buy-in penalties and lower commission is Pareto-dominant than a strategy which uses only higher commissions. If the seller is convinced to accept a lower reserve price, the total expected revenue of the auction will be increased. Yet, in in the context

of the guarantees it appears conspicuous that for a seller it is more attractive to set a higher reserve price since he or she will receive the expected profit anyway. Clearly the institution will fight harder to set an unrealistically high reserve price. The dispute will end up only when the final reserve will be set. The value probably will be higher than in a normal case (it must be kept in mind, as stated above, that a similar negotiation take place only when the consignment is significantly high).

Regarding the in-house guarantees, it must be cited the analysis of Greenleaf, Ma, Qiu, Rao and, Sinha (2002). They indeed clearly show that the guarantees provided by the auction house itself make it considerably worse off while make the seller better off. In this particular case, the loss is attributed to the ability the seller has to negotiate the commission while setting a guarantee on an object at auction. Furthermore, is interesting how they point out that the chance to obtain a guarantee at whichever auction house give the seller the chance to threat to "walk away". This means that sellers can obtain a significant fraction of the expected revenue from the auction house through the guarantee. Aimed to avoid the in-house guarantees and then all the risks connected, Sotheby's was the first to introduce the third party guarantees. A third party guarantee is a particular type of guarantee in which the auction house involves another company to assure to the seller the amount he or she expects from the sale. However, the result does not differ significantly from the previous result because for the seller does not make any difference whether the auction house itself or a third party provides the amount he or she expects.

Nevertheless, it is matter of argue if the auction house behaves honestly toward both the seller and the buyers because it may make even illegal moves to ensure its desired result. It has been analysed the so-called *bidding off the wall* and *shill bidding*, as previously touched on. They are both aimed to protect the item at sale from an under-price sale through the reserve price. *Bidding off the wall* is a process by which the auction house decides to bid through a fake bidder (*shill biding*) in order to buy-in the item. A similar event usually take place when there is a chance to meet the reserve price but the price level reached by bids is still not desirable. It is evident that a similar practice is directly connected to the reserve price criterion because it implies that meeting it does not assure the object to be sold. To adjust the ongoing auction manipulating the bids in order to do not reach the reserve price amount or buy-in the object have direct consequences for the unaware buyers.

Another case, yet closely bonded to the reserve price meeting, is the "shill bidder" hired by the seller in order to increase the bids competition and ensure the reserve price to be met. Through the hiring of a shill bidder the seller can be sure to gain a certain level of profit. It is important to remember that these two practices are both illegal but, in particular for *bidding off the wall*, very difficult to be found and then supposedly spread throughout auctions.

Nonetheless, as observed by Lamy (2008), a seller might surprisingly prefer an auction house with larger fees that would help him to comply with the auction rules despite the outlaw system cited above. The presence of a *shill bidder* combined with high commissions would thus enlarge the set of implementable mechanisms, incrementing the seller's expected profits. This is theoretically possible because of the *shill bidding*. As stated by Lamy (2008) in his paper:" if the *shill bidding* cost is sufficiently low, then the seller's preferred final value fee is strictly positive and thus positive fees arise in equilibrium.". It is clear that there is a negative proportionality between the increment of the fees and the hiring cost of the shill bidder. However, it is basic for the full understanding of the topic to mention that the analysis made by Lamy (2008) is only theoretical because of the presence of a model in which the *shill bidding* is allowed and of the amount of the reserve price known by the participants in the auction.

What said above have profound implications to what found by Beggs and Graddy (2008). A piece of art that do not meet its reserve price will have the future hammer prices negatively affected. Thus, for auction houses there is a loss of present and future value in case of an artwork that goes unsold. The present loss of value is represented by the missed sale, whilst the future loss of value is indeed the lower hammer price the artwork will achieve. However, there was awareness amid auction houses about this phenomenon even before the paper of Beggs and Graddy (2008). The auction houses tried and keeps trying to avoid the items to be bought in, in order to achieve higher revenues. Higher revenues are achieved only because of the presence of a similar peculiarity in the art auctions. It is important to notice that a failure in meeting the reserve price is particularly serious in art auctions not only because of the *burning effect*. In fact, in the art auctions a failure in meeting the reserve price in the past is an important signal for buyers about the desirability of the object which will permanently affect the future of a piece of art which failed at auction.

Beggs and Graddy (2008) analyses the trade history of several artworks and whether they have reached their reserve price or not. In particular, the paper focuses on the buy-in rate, then if the artworks have been sold or not. Based on the result of what previously said, they analyse the financial return of the artwork in order to find a rule that defines if, in case of a failure in meeting the reserve price, the economic value has been affected. The major difficulty of this study is to create new datasets, which include also unsold items and not only sold ones, in addition to the number of characteristics every painting has. In fact, there have been very few studies in this field so far also because of the obstacles in collecting data. In particular, Beggs and Graddy (2008) repeated sales several times with the help of a dataset specifically created for this purpose. The result states that a painting that has failed to be sold at an auction has a return of 30% less than those which have been sold instead. A similar consequence sheds light on the already cited *burning effect*.

3 Theory behind the reserve price in art auctions

In order to deliver a proper analysis, we are now going to introduce four papers that are crucial for the comprehension of the next chapter, where we develop an original questionnaire to better understand the policy associated with reserve price setting. They indeed have been selected as the basis of the questionnaire that follows in the next chapter. Here we propose an analysis and an explanation of what they consist.

3.1 Bidding off the wall: why reserve prices may be kept secret

Vincent (1995) studies the implications of setting a reserve price. In his analysis, he takes into account a second-price auction, although he recognises that the English auction is mainly spread. However, he points out that the consequences of keeping the reserve price secret can only be stronger in an English auction because of the way the information is distributed and collected among the bidders. Therefore, the example here proposed is suitable for other contexts such as an English auction rather than only for a second-price auction.

In particular, Vincent (1995) states that the seller could adopt a strategy of revelation of the reserve price. In this way, the information asymmetry between the seller and the bidders is eliminated. The removal of such asymmetry increases the average level of bids as the bidders have the chance to know the amount of reserve price and then remove the uncertainty over it. It is then evident that such behaviour enhances the seller's revenues since a generally higher level of bids can substantially increase the value of the highest bid along with generating more competition among all the bidders.

However, it is important to shed light on the inhibiting effect of an announced reserve price. This phenomenon happens because in case the actual reserve price is higher than the expected value a bidder has of the object for sale, this might cut him or her out of the auction.

There are then two consequences that directly follow the decision of the seller to make public the reserve price. First, by revealing the value of the reserve price, the general increase of the average bid enhances the revenues of the seller. On the other hand, in case the revealed reserve price is higher than what a potential bidder thought to pay for an item, this would discourage a potential buyer from participating in the bidding fight.

In such a framework, for any reserve price there is a positive likelihood that some sales will fail even if the information is fully available in the auction and then in theory there should be the chance to generate a bid with a value above the reserve price. Moreover, it is important to say that the framework is designed as a Bayesian game (a game in which the information about each player's characteristics is incomplete) in which the Nash equilibrium is determined by the behaviour of the bidders. Indeed, the seller will choose his or her best reserve price r given the type of bidders and then they will choose their best bidding strategy.

Regarding this particular case, since it is analysed a second-price auction, in the case of an announced reserve price r by the seller, if the second highest bid is over the value of the reserve price, the winning bidder will pay the object at a price that exceeds the reserve price. But if the winning bidder has a bid over the reserve price and the second highest bid is lower than the reserve price, then the winning bidder will pay the amount of the reserve price.

Furthermore, it can be assumed that in the case the seller had a user value s commonly known, then it would not have been different whether the reserve price were secret or not. In fact, if the s were known, the bidders would have calculated the seller's reserve price and behaved as if it were announced. Alternatively, in the case where s were random and the seller were the only one to observe it, he or she could announce the reserve price r and conduct the auction as it has been previously discussed.

Another option would be to inform the auctioneer about r and in case the bids would not go high enough, he will have to accept bids off the walls. In such context, the highest bid could be either of the bidder or of the seller.

Conclusively, it must be noticed that the welfare analysis of the seller is done *ex-ante*. This means that the seller has to be able to commit himself or herself to an auction policy of always reveal or never reveal the reserve price before having information over the various types of buyers. In addition, it appears evident that the auctioneer act as a sort of decision maker regarding whether or not commit with the seller to the policy he or she decided. However, a low announced reserve price will not discourage bidders in any case. This conclusion is compelling in auction houses decision of whether or not operate with announced reserve prices and hence attract low-price types of sellers.

These are sellers whose expected revenue is rather low. They are then willing to set a reserve price which is not high.

3.2 Sale rates and price movements in art auctions

The aim of the study of Ashenfelter and Graddy (2010) is to demonstrate through an analysis on two different datasets that unexpected price movements occur. Thus, it is important to set the right reserve price in order to compensate these price movements and achieve a successful sale.
It is defined as an *unexpected price movement* a percentage difference between the pre-sale estimates provided by the auction house and the actual sale price.

The analysis is composed as two linear regressions on two different databases of both Impressionist and Contemporary artists.
The first dataset used, regarding impressionist artworks, is composed of two different parts. In the first part there are sales occurred at Christie's and Sotheby's in London and New York between 1980 and 1990. This dataset is constructed through public price lists and auction catalogues from the two auction houses. The second part is comprehensive of sales between 1990 and July 2007 occurred between the same auction houses. The data was collected through Hislop's art sales index and ARTNET database.
The second dataset is composed of contemporary artworks and it is made of sales occurred at Christie's in London between 1982 and 1994. The data is collected through the archives of Christie's. In this second dataset only, there are observations on both the sale price in case the item went sold and the highest bid for items that went unsold.

The data indicates that the average sale rate is 69.8% for impressionist art and 77% for contemporary art in the considered period. Therefore, what comes up first from this data is that the sale rate which could be considered as "normal", is higher for contemporary art than for impressionist art. Furthermore, it is shown that these sale rates fluctuate around a stable level with no consistent correlation with an index of prices. However, the negative correlation present between price indices with a yearly lag and the sale rates indicates that price shocks could drive sale rates.
Therefore, it is calculated the buy-in rate in order to test the statement above. The buy-in rate is calculated as one minus the sale rate and it is then compared to the price shocks.

Price shocks are computed as the ratio of the sale price to the average estimate minus one for each painting and then averaged over each auction.

It is important to say that for the contemporary art it is separated price shocks for sold artworks and price shocks for unsold artworks (with the high bid intended as the hammer price).

It is proved that for unsold items, the price shock is significantly negative. Thus, it is clear the presence of a strong relationship between price shocks and buy-in rates. In fact, it is proved that in a dataset composed of 3295 artworks, 1236 of them are sold at or below the low estimate. This phenomenon happens probably because as in the labour market as in the art word, a positive price shock increases the sale rate since more painting owners receive price offers above their reservation price.

Thus, for contemporary art the average hammer price is 87% of the low estimate whilst the high bid of unsold items is averagely 72% of the low estimate. On the other hand, for impressionist art the 37% of the sample has an average hammer price for sold artworks that is 90% of the low estimate.

To sum up, it is proved that there is a constant presence of *unexpected price movements* in art auctions. These shock of the prices have a positive and strong linkage with the auction sale rates. In order to fight these price shocks, the reserve price should then be set at 71% of the low estimate. It is evident that a similar reserve price that could potentially lead to greater sale rates have a positive influence for the market observers. It indeed affects the sale rates that indicates how aggregate price are evolving.

3.3 Art experts and auctions. Are pre-sale estimates unbiased and fully informative?

Bauwens and Ginsburg (2000) make an analysis in order to test whether the pre-sale estimates are biased or not. In this extent, it is important to notice that the estimates have a key role in setting the reserve price as they serve as the basis for it. There are two dynamics that occur in a potential sale as pre-sale estimates and the reserve price are not interdependent. The first dynamic is the way the seller's reserve price is perceived by the potential buyers as they could believe is too high. The second one is that a seller will be unlikely to accept low pre-sale estimates since this lower his or her

ideal reserve price. It is in fact a generally accepted rule that the reserve price should be at or below the low estimate.
In this analysis it is analysed whether the pre-sales estimates, crucial for the reserve price, are faithful or not. Moreover, is also tested whether, the information the auction house has, is fully taken into account in producing the estimates.

In order to make the analysis work, there is need of a specific dataset. In this case it is taken a dataset composed of 1,621 English silver coffee and teapots, auctioned by Christie's and Sotheby's London between 1976 and 1990. Thus, for each piece, there is information regarding the characteristics described in the pre-sale catalogue, pre-sale estimates and hammer price.
In the database there are observations in which are recognisable an underestimation $\hat{p}_{min}$, an overestimation $\hat{p}_{\max}$ and the hammer price p. The hammer price falls within $\hat{p}_{min}$ and $\hat{p}_{\max}$ 49% of the total observations for the 1982-1989 period and 37% of the total observations for the 1988-1990 period. Moreover, it is assumed that there is no difference in treatment between cheap and expensive pieces. Lastly, it is important to say that in the provided dataset there are only sold items.

It is then defined what the value of the pre-sale estimate, indicated with p, has to be. As the common sense suggests, setting it at a midpoint within $\hat{p}_{min}$ and $\hat{p}_{\max}$, would be considered wrong because it would imply that the pre-sale estimates are unimodal and symmetric. However, it is acceptable that the best value of the pre-sale estimate is the midpoint within the low and high estimates because of the presence of higher and lower values which compensates the differences in prices.
Thus, the analysis indicates that the hypothesis for both Christie's and Sotheby's aimed to prove whether they behave identically or not is strongly rejected. This result shows indeed that the two auction houses behave substantially differently. Therefore, it is to accept the hypothesis that they both provide biased estimates.

What comes up from the analysis is that Christie's tends to underestimate methodically for all the pieces, while Sotheby's overestimates inexpensive pieces and underestimates expensive ones. The boundary that divides Sotheby's expensive and inexpensive pieces is £510. This result is in accord with the general observation that 46% of the objects are sold at values above the maximum estimate.

Another test worth doing is to analyse whether the information contained in the pre-sale catalogue is fully taken into account by auction house experts in providing the pre-sale estimates.
The result indicates that experts do not consider completely the information contained in the pre-sale catalogue. However, in the proposed analysis it is assumed that experts can correctly predict time trend, which is unlikely to be real. This result leads to the final conclusion that even if experts would be forgiven of mistaking the trend in the estimation process, they could anyway be seen as not using completely the information they have.

In summary, pre-sale estimates are biased for both auction houses. This result is even more evident if is taken as pre-sale estimate value the midpoint of the high and low estimates. One possible reason for such behaviour is that Sotheby's might prefer to avoid selling cheap pieces, then predicting higher prices and attracting other by predicting lower ones. On the other hand, Christie's has the tendency to underestimate systematically, probably for assuring to do not fail at auction. However, it seems that for both auction houses there is an attempt to attract more people in the salerooms.
Another interesting result is that the information contained in the pre-sale catalogue is not fully taken into account by the experts in producing the estimates for each piece of art. This lead to the result that they could reduce the biasedness by using better such information.

3.4 Failure in meeting the reserve price: the impact on returns to art

The aim of the analysis of Beggs and Graddy (2008) is to shed light on how reserve price movements for unsold paintings occur as well as individuate which factors can contribute to the variations of such movements.
We already said that, before an auction, a catalogue with all the information about every lot is published by the auction house in order to inform all the potential bidders about every piece of information regarding each item for sale. This presale catalogue includes the high and the low price estimates, with the exception of the reserve price which is usually kept secret, even if it is most of the times at or below the low estimate. Reserve

prices reflect indeed many aspects of the item such as the desired revenue or the status of the seller (whether in rush for a sale or not). However, the primary use of the reserve price it is to maximise the seller and auction house expected profit.
It is, then, very complicated to set a right reserve price in order to be reached, because it must be considered that there are three main implications involved into this theory and that may affect the evolution of the sale at auction:

1. A past failure in meeting the reserve price lowers the potential value because it is considered as a very negative signal in the item trading history. Indeed, it is seen a lack of interest which reflects a loss of attractiveness by the demand. This phenomenon is the already cited *burning effect*.

2. The reserve price is the discriminant factor which determines the price of the sale. Therefore, based on what the seller thinks the value of the object is, he or she will set a certain reserve price in order to achieve its economical purpose and the possible need of a rapid sale. It is reasonable to think that the seller will lower the reserve price in order to achieve a successful sale after a failed attempt to sell the object at a certain value.

3. Similarly to what said in the first two points of the analysis, there is the need to accommodate the request of the market. In fact, it may lose interest in the artwork once a failing sale occurs. Thus there is the need to follow the path of the market trend in order to avoid another unsuccessful sale, then lowering the reserve price. It is important to note that a regression analysis can only check the market trend. In fact, a regression is not suitable to check a change in the idiosyncratic trends in taste.

What it is required for this specific analysis is a dataset that it is shaped on the *burning effect*. Therefore, there is need to include in the dataset not only the successful sales but also the unsuccessful ones. Beggs and Graddy (2008) consider 58 Impressionist and Modern artists in 150 auctions at both Sotheby's and Christie's in either New York or London between 1980 and 1990 for creating the dataset. It is verified if they appeared at auction at least twice with a successful sale and an unsuccessful one without taking into account the order of these events. If so, they are added to the dataset. Furthermore, in case of a two successful sales regarding an artwork, it is added into the control group.

Begs and Graddy (2008) use the above mentioned decade to select the potential paintings and search the trading history of each of them using Art Index. They select only paintings that have at least two successful appearances in their whole trading history and add them into the so-constructed dataset. There is then information for each painting, about: author, title, auction house, auction location, lot number, auction date, sale price in currency of auction location, painting ID, low and high price estimates in currency of auction location every painting. Only the reserve prices and the sellers' identities are secrets due to the auction houses policies. Beggs and Graddy (2008) also add repeated sales data from 1965 to present taken from the MeiMoses index to the so shaped dataset. They do so in order to ensure that they have enough data to test the time effects. The added data from the dataset made by Mei and Moses consists in painting characterised by a SOLD, SOLD appearance. The prices of this study are commissions-free, so that only the "hammer price" is analysed.

In order to achieve the goal of the study, only two types of appearances for each painting are considered: indeed, either a painting has a history of no coming up at sale between two purchases or it has appeared at sale but it failed to meet his reserve price.
To clarify, the table 3.4.1 is proposed:

First period	Second period	Third period
SOLD	-	SOLD
SOLD	FAIL	SOLD

Tab 3.4.1 Table of the used analysis framework

Clearly, every row can be repeated several times per item. It is essential to notice that it is contemplated a similar kind of observation in order to avoid bias that may come from a different kind of observations (e.g. F S S, where the initial sale failure may affect both hammer prices of the following successful sales, exaggerating and twisting the *burning effect*).
Thus it is worth comparing the SOLD, FAIL, SOLD and the SOLD, SOLD observations. There are several consequences that emerge from this analysis.
Firstly, the price difference and the price ratio is lower in the SOLD, FAIL, SOLD observations. This proves the less attractiveness for an artwork that failed at auction

amid the bidding population and the consequent behaviour of the auction house in setting the reserve price. Secondly and consequently to what stated above, paintings with no failures in the past are costlier that the ones that have it. Lastly, it is worth noticing that the period waited between two appearances at auction is generally lower in the SOLD, SOLD observations even if is higher in the Mei and Moses data rather than in the other data. The difference between Mei and Moses dataset and the constructed one is that Mei and Moses looked and the provenance in adding a painting in the dataset. This means that not all the previous sales have been added, especially if they occurred in a short succession.

Thus, there is a negative connection between the failure in meeting the reserve price and the expected revenue. It is proved that a fail effect is much more consistent than it might have been thought. In fact, artworks that fail to meet their reserve price have a 28% lower return than others that do not fail. Coherently with the results about failed sales, an analysis on the pre-sale estimates shows up similar results, confirming the proposition above. This is significant because the low estimate is not only a subjective decision of the auctioneer about trends and desirability of the artwork, but it also reflects an estimate of the previous successes of the painting.

Differently to what it has previously done, also a comparison between a SOLD, FAIL SOLD and a SOLD, SOLD, SOLD painting is made. The control group remains in this case as well composed by SOLD, SOLD observations and painting in the Mei and Moses dataset.
The result leads to the conclusion that the fail effect is significant, confirming the result obtained with the first analysis.

In conclusion, it has been shown how the *burning effect*, affect the final price of a painting since it modifies the reserve price or a change in the tastes trend. From the study emerges that the average loss of return is approximately 28%, but the number varies very much considering other variables such as the time, if the painting has come at auction in the same auction house and others.
However, the change of the auction house does not provide a solid reason by which the trend should be affected since the information is now online, so that the clients are most of the times aware about the history of the painting. Furthermore, the seller's reserve

price may be the result of a competition between auction houses, bringing a misleading result and then incoherent hammer prices between several sales in different auction houses.

4 The empirical analysis of the auction houses behaviour in Italy and United Kingdom

According to what stated in Chapter 1, 2 and 3, auction house behaviour is the result of several factors that influence it. In this chapter, we present a questionnaire that we specifically designed to test how the auction houses behave in art auctions. We compare the answers received with the theory presented in Chapter 2 and 3 in order to test whether or not it is taken into account by auction houses.

For our sample, we purposely decided to consider only few auction houses in both Italy and the UK as we are interested in the quality of the auction houses rather than the quantity. Indeed, we selected the most important national auction houses in terms of consignments values. We collected our data using Art+Auction Special Annual Issue 2015 and ARTNET database. However, as mentioned in the Chapter 1, we decided to avoid considering Sotheby's, Christie's, Bonhams and Phillips. In fact, we repute those auction houses as part of a separate market that cannot be taken into account in this kind of analysis, despite most of the references proposed concern Sotheby's and/or Christie's.

4.1 Our questionnaire

We propose seven questions posed to the auction houses and explain here why each query is designed in this way.

Q1. *"Is the reserve price decided by the auction house together with the seller or the by the auction house alone?"*. We decided to ask this question because as we widely discussed in the previous chapters, the setting of the reserve price is a strategic driver that can lead the auction to success or failure. It is then important to figure out whether the auction houses try to meet the requests of the seller or if it is completely responsible for its strategic behaviour. Furthermore, it is interesting to understand how the auction house and, in case, the seller behave toward the heterogeneity of audience and its will to purchase the artwork either for collecting or for trading.

Q2. *"The scientific literature suggests that the reserve price should be set approximately the 70% of the value of the low estimate. Is this your case as well or there are variables you consider in order to decide its value? If so, what are these variables?"*. In this case, we decided to pose a similar question because of Ashenfelter and Graddy (2010)'s paper, reported in Section 2.1 and 3.2. In fact, they prove that the reserve price is to be set at the 70% of the low estimate in order to fight the price oscillations. We then decided to verify whether the auction houses follow this indication on not for succeeding during the auctions.

Q3. *"Is the reserve price always present in every lot for sale?".* We decided to pose this question in following the discussion of the previous chapter. In fact, we demonstrated in the second chapter that the reserve price is a driver that maximises the expected profit of the seller or, like in this case, of the auction house. Varian (2010), see Chapter 2, indeed demonstrates that the presence of a reserve price in an auction unequivocally increase what the revenue of the seller will be. Therefore, we decided to test whether this mechanism occurs in art auctions as well.

Q4. *"By which criteria are decided the high and low estimates present in the pre-sale catalogue for each lot for sale?"*. In this case, we decided to ask a similar question because of the tight link between the estimates, particularly the low estimate, and the amount of the reserve price. Furthermore, referring to Q2, this appears as an evident and reasonable question. In fact, as the estimates are decided, the low one will work as a basis for the determination for the reserve price, which might be at, below or above the level of the low estimate. Moreover, following what stated by Bauwens and Ginsburg (2000), reported in Section 2.1 and 3.3, it is even more convincing to run a test aimed to verify whether in art auction the estimates are strategically biased. In addition, Ashenfelter and Graddy (2003), see Section 2.1, clearly highlight what the role of experts in determining the estimates. This query is then made in order to verify if having a more suitable basis for the auction houses on which set the reserve price is something that really occurs.

Q5. *"Is the amount of the reserve price known to the bidders in certain circumstances or is it always unknown?"*. This question is posed following the study of Vincent (1995), reported in Section 2.1 and 3.1. He clearly demonstrates the economic

advantages as well as the utility in keeping the reserve price amount secret. Therefore, we want to check what the auction houses behave regarding this during art auctions. Furthermore, as Ashenfelter (1989), state, see Section 2.1, the reserve price has always been kept secret. Thus, the query investigates whether this still happens in art auctions or if there is some way to know the amount of the reserve price to bidders.

Q6. ”*Is the presence of the reserve price known to the bidders?”*. We decided to ask this question because of the strategic behaviour the bidder can have. In fact, we previously stated that, basing on the work of Ashenfelter (1989) and of Milgrom and Weber (1982), see Section 2.1, the presence of the reserve price is not always presentment. However, particularly Milgrom and Weber (1982), prove that releasing information increases the prices. Clearly public information encompasses also make notice of an eventual presence of reserve price to bidders.

Q7. *“Are there strategies through which the auctioneer can be sure that the reserve price is met or that the hummer price will fetch a certain amount (presumably high enough to satisfy the needs of the seller and of the auction house)?”*. Probably this question summarises the whole work we are carrying on. In fact, as demonstrated by the bibliography proposed, the reserve price is the keystone whereby the result of an auction in general, and specifically an art auction, is decided. The first reason by we decided to ask this question is because of the work of Ashenfelter (1989) and Beggs and Graddy (2008), reported in Sections 2.1 and 3.4. They indeed clearly show that whenever an artwork fails at auction, its future return will be lower. This piece of evidence was first assumed by auction houses and then clearly proved. We then want to investigate how auction houses prevent the already cited *burning effect*. Moreover, we have already said how the guarantees and third parts guarantees are a new way by which auction houses can assure a certain hammer price or reach the reserve price and have a successful sale. In this regard, the work of Greenleaf and Sinha (1996), see Section 2.1, the one of Greenleaf, Ma, Qiu, Rao and, Sinha (2002), see Section 2.1, and the one of Graddy and Hamilton (2014), reported in Section 2.1, are pivotal. We are then willing to verify whether this phenomenon occurs in auction houses which are not the major four. Lastly, in the perspective of the *shill bidding* and *bidding off the*

wall, we take into account what Lamy (2008), see Section 2.1, states. We are then willing to verify what are the strategies the auction houses can implement in the art auctions, aimed to pursue a successful sale.

However, it is important to notice that the analysis of the four papers done in Chapter 3 underlines the fact that we consider those sources as a general basis on our questionnaire.

4.2 Coding the information

In such framework, we code answers received in order to have a value and then have a clear representation of the different behaviours of the auction houses in Italy and UK. We then compare the answers to the theory in order to verify what parts (if any) of the theory proposed is actually followed by auction houses.

Table 4.2.1 summarises our data coding.

	Codex	
	Value	Information
Q1	1= 2=	Auction house alone. Agreement with the seller.
Q2	1= 2= 3= 4= 5=	At the low estimate. 80%-90% of the low estimate. 70%-80% of the low estimate. 70% of the low estimate. Above the low estimate.
Q3	1= 2=	Present in every lot. Not present in every lot.
Q4	1= 2=	Personal opinion of the auction house specialists. Market trends alongside aesthetical criteria.
Q5	1=	Known.

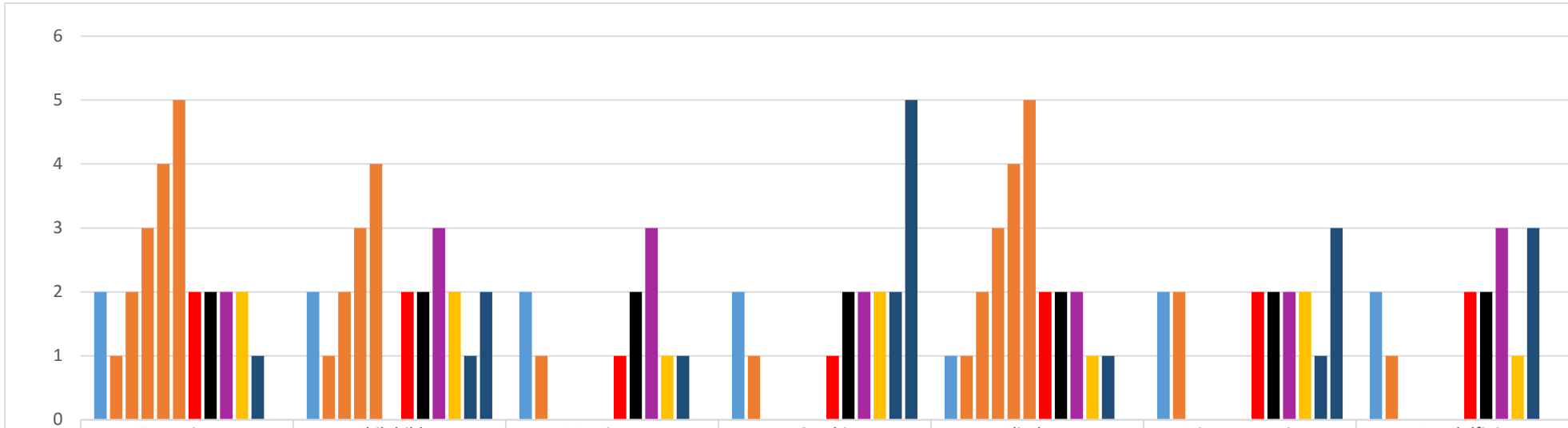
	2= 3=	Unknown. Known indirectly.
Q6	1= 2=	Yes. No.
Q7	1= 2= 3= 4= 5=	The reserve price is set at a low value but close to the low estimate in order to create a momentum. The pre-sale offers (online offers or sealed offers) increase the competitiveness. There is a percentage discretion of the reserve price the auction house can manage (the auction house renounce to part of the commissions). Taking bids off the wall. The auction house can bid on behalf of the seller.

Table 4.2.1 Description of the process of codification of the information

4.3 Representation and interpretation of the results

As just seen, the table above can be intended as the matrix through which interpret the data. In this way, we are able to make a comparison between the different behaviours of Italian and British auction houses and the theoretical knowledge proposed.

Here we present two charts that make evident the large differences between Italy and UK that exist in the strategies adopted. We first analyse a chart that summarises the Italian strategic behaviour. Secondly, we analyse the British ones.



	Farsetti arte	Philobiblon	Meeting art	Cambi	Blindarte	Minerva Auctions	Pandolfini
Q1	2	2	2	2	1	2	2
Q2	1	1	1	1	1	2	1
Q2	2	2			2		
Q2	3	3			3		
Q2	4	4			4		
Q2	5				5		
Q3	2	2	1	1	2	2	2
Q4	2	2	2	2	2	2	2
Q5	2	3	3	2	2	2	3
Q6	2	2	1	2	1	2	1
Q7	1	1	1	2	1	1	3
Q7		2		5		3	

Fig. 4.3.1 Summary chart of the results of the questionnaire for Italian auction houses

As it appears evident, auction houses in Italy tend to behave differently compared to what Ashenfelter and Graddy (2010) state. They indeed usually set the reserve price either at the low estimate or at a variety of different values below the low estimate. In two cases the reserve price is even above the low estimate. This behaviour definitely indicates that they do not consider 70% of the low estimate as the optimal value on which set the reserve price.

Another point worth noticing is that, according to Bawens and Ginsburg (2000), the pre-sale estimates are substantially biased. Based on our survey, we can assume that the major auction houses in Italy rely on objective factors in the process of determining the estimates. Thus, it is acceptable the hypothesis that auction houses provide unbiased pre-sale estimates. This result clearly contradicts the theory proposed by Bawens and Ginsburg (2000).

Furthermore, Italian auction houses seem to do not be in accordance with the theory proposed by Vincent (1995). In fact, although the reserve price is officially secret, because its value is usually at the low estimate, most of the times it can be fairly assumed by the bidders. This undoubtedly generates a lack of efficiency according to Vincent (1995), in addition to what generally taken as true and described by Ashenfelter (1989).

Additionally, it is interesting to notice how auction houses in Italy approach to the problem of failing at auction. Indeed, as Beggs and Graddy (2008) prove, a *burning effect* does exist for artworks. In this regard, what comes up from the data is that in this case usually there is the tendency to create a momentum among the bidders. This is obtained by setting the reserve price below the lower estimate but close enough in order to be easily reached by few bids. Moreover, it is to notice that there is also a variety of combinations in terms of strategy. In fact, as it is evident from the chart, some auction houses combine the already cited strategy with the acceptance of pre-sale offers and percentage discretion on which play. With the first one, the auctioneer is able to raise the bids by himself or herself. With the second one, the auction house purposely renounces on parts of its commissions so that it can be able to lower the reserve price and assure the sale. Evidently, this second strategy is implemented whenever the context suggests so as it is not obviously the favourite by auction houses. All the combinations the auction houses in Italy adopt in order to assure the sale certainly indicates that they are aware of the *burning effect*. We can assume that they consider true what generally

known thanks to Ashenfelter (1989) and proved by Beggs and Graddy (2008) about artworks that fail at auction.

Other points worth analysing are those regarding Q1, Q3 and Q6.

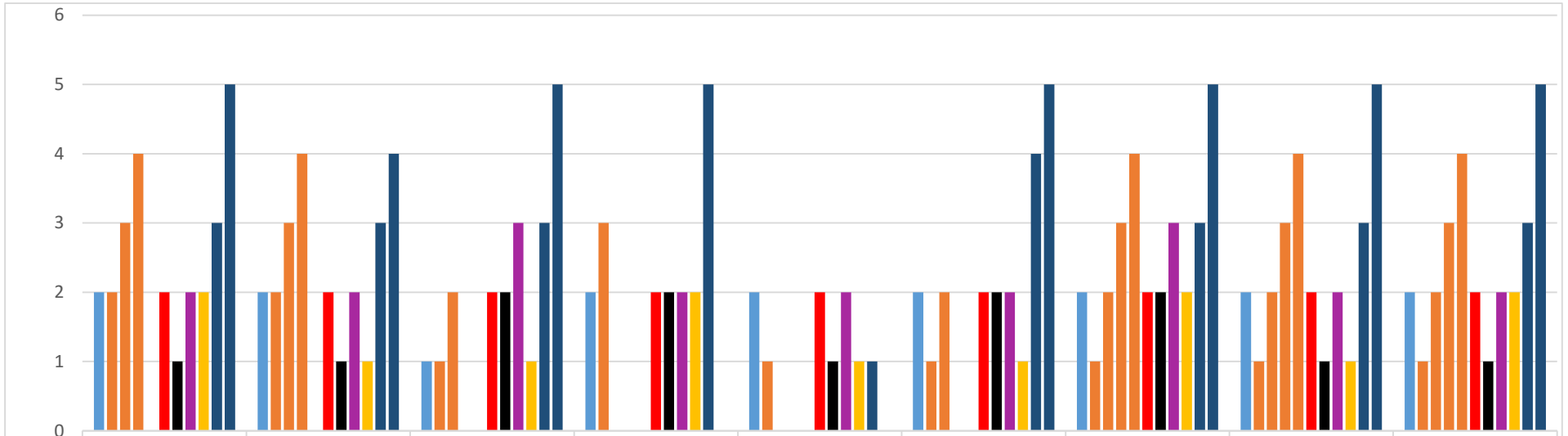
What is noticeable regarding Q1 is that almost every auction house among those involved tends to find an agreement with the seller in the setting of the reserve. This clearly indicates that the opinion of the vendor is always taken into account despite the interests the auction house has in setting a right reserve.

Regarding Q3 we can notice that the reserve price is not always present in every lot for sale. There is indeed a discrimination which is generally the value of the lot. If the lot is worth few Euro, it will be simply sold to the highest bidder.

It is noticeable what comes up from the data regarding Q6. In fact, the majority of auction houses do not let the presence of the reserve price to be known. This choice, according to Varian (2010), reduces the efficiency of the auction. However, it is to say that the result showed by Varian (2010) consider a situation in which every player is completely rational. Evidently this framework does not reflect the reality.

It is then to consider that probably auction houses tend to do so in order to do not give any certainty to the bidders. As we discussed in Chapter 2, this uncertainty, in the real world, contributes to create a challenge among the potential buyers. However, it is interesting to notice that another large part of our sample let the presence of the reserve price to be known to the bidders. In this extent we can then assume that in Italy keeping the presence of the reserve price secret only partially generates a momentum.

Figure 4.3.2 presents a chart that summarises the strategic behaviour of auction houses in the UK.



	Chiswick Auctions	McTear's Auctioneers	Keys Fine Art Auctioneers	Duke's	Macdougall arts	Lyon & Turnbull	Dreweatts & Bloomsbury*	Woolley and Wallis*	Sworders fine art auctioneers
Q1	2	2	1	2	2	2	2	2	2
Q2	2	2	1	3	1	1	1	1	1
Q2	3	3	2			2	2	2	2
Q2	4	4					3	3	3
Q2							4	4	4
Q3	2	2	2	2	2	2	2	2	2
Q4	1	1	2	2	1	2	2	1	1
Q5	2	2	3	2	2	2	3	2	2
Q6	2	1	1	2	1	1	2	1	2
Q7	3	3	3	5	1	4	3	3	3
Q7	5	4	5			5	5	5	5

Fig. 4.3.2 Summary chart of the results of the questionnaire for British auction houses

* this data was collected through the Terms and Conditions and auction catalogues of the auction house.

Differently to what said before regarding Italian auction houses, in this case the law imposes to do not set the reserve price above the low estimate. This means that a vast majority of British auction houses tend to set the reserve price at the low estimate as well as at a wide range of values below it. Thus, auction houses in UK decide where to set the reserve at, based on the necessity of every specific eventuality. It is important then to notice that in this case as well there is no adhesion to what Ashenfelter and Graddy state (2010). However, whenever the reserve price is set at 70% of the low estimate, it is not a fixed rule.

Moreover, it is important to notice that the estimates are most of the times decided as a personal opinion of auction house specialists. This results suggests that in UK pre-sale estimates are biased. Thus it seems to be confirmed what Bawens and Ginsburg (2000) states. British auction houses use high and low estimates as a strategic asset in order to set the optimal reserve price. However, it is important to say that another large part of auction houses rely on objective factors in determining the pre-sale estimates. Therefore, we can suppose that, although estimates are used as a strategy, they are not crucial in the success of an art auction. This result is interesting if compared to the standard behaviour in Italy. Indeed, such different attitude remarks how important is the determination of pre-sale estimates in UK for strategic purposes rather than in Italy.

In addition to what just said, it is straightforward that auction houses do not reveal the amount of the reserve price to bidders. In this way, they follow in a certain way what Vincent (1995) states. This is surely a more efficient way whereby conduct the auction as it generates a greater competitiveness among bidders. Thus, it is clear that British auction houses take into account the theory proposed.

Moreover, it is worth analysing Q7 as it is the most important of the whole questionnaire. In this regard, there is the predominance of bidding on behalf of the seller in order to create a momentum along with the presence of a percentage discretion on which the auction house can act in order to lower the reserve price. What is noticeable in this case is the preponderance of the percentage discretion. In fact, since that auction houses are available to renounce to parts of their commissions, it is clear that they seriously consider the *burning effect* and try to avoid it as much as they are concerned. In this extent, they then consider truthful what Beggs and Graddy (2008) prove. Yet, is it important to say that these two strategies can be taken separately. Indeed, they appear also alongside other strategies such as taking bids off the wall. In a comparative perspective, this attitude is completely different from that used in Italy. In particular,

the broad usage of bidding on behalf of the seller it is a strategy vastly applied in UK. On the other hand, in Italy only one auction house tends to use it.

Lastly, it is interesting to analyse the other queries in order to check what the overall strategic behaviour of the auction houses in UK is. Other points worth noticing are those regarding Q1, Q3 and Q6, as before.

The most interesting thing to notice regard Q1 is that, again, there is almost always an agreement with the seller for the amount of reserve to be set. This is a clear signal of the fact that the vendor has the final word about the way of selling an artwork. Thus, auction houses must be worried by the potential threat of the seller to "walk away".

The analysis of the data regarding Q3 indicates that there is always a discrimination process whether to put a reserve or not. In fact, the totality of our sample does not put reserve price on item for sale either because of low value of the artwork or as result of a negotiation with the seller. It is then evident a commingling of interests for a good sale at auction and of a constant care in not letting the seller go away.

Finally, it is important to mention the main characteristic about Q6. It is shown that more than half of the sample make notice of the presence of the reserve to bidders. This behaviour is evidently specular to what is the standard in Italy. It is clear that in UK what Varian (2010) states is considered. However, such diversity could be explained by the different type of bidders between UK and Italy. Thus, it is probable that the theory proposed has to be contextualised in order to have a valid meaning even in real auctions.

In order to give an accurate view of the results of our questionnaire, we propose a brief statistical analysis of the data obtained. In particular, we run a test aimed to verify how strong is the β correlation coefficient, if any. The β correlation coefficient is a measure which indicates whether a linear dependence between two variables exists. It is obtained as the ratio between the covariance of two variables and the product of their variances. Furthermore, it is important to say that we propose only significant results at a 5% or 10% p-value. The p-value is definable as the value which indicates when a result is not casual.

We then propose the table 4.3.1 that makes evident the data we obtained.

	Q1	Q3	Q4	Q5	Q6	ITA
Q1	1.0000					
Q3	0.1429 0.5976	1.0000				
Q4	-0.2548 0.3409	0.2548 0.3409	1.0000			
Q5	-0.1529 0.5719	0.1529 0.5719	0.4545 0.0769	1.0000		
Q6	-0.3780 0.1489	0.0000 1.0000	-0.1348 0.6186	0.1348 0.6186	1.0000	
ITA	-0.0476 0.8610	0.4286 0.0977	0.5946 0.0151	0.2208 0.4111	-0.1260 0.6420	1.0000

Tab. 4.3.1 Table of the summary results of the significance test

In particular, it is evident that we have three significant results.

The first one is the one at the intersection of the Q5 row and the Q4 column. It indicates that, based on our sample, all the auction houses, regardless of the country, tend to always make the reserve price unknown when the estimates are based on market trends. This result is proved by a 0.45 correlation coefficient significant at a 10% p-value. This means that is probable to find an auction house with pre-sale estimates obtained by looking at market trends that makes the amount of the reserve price indirectly known to the bidders.

The second one is the one at the intersection between the ITA row and the Q3 column. It indicates that in Italy auction houses do not always put the reserve price on artworks for sale. It happens only two times out of seven. On the other hand, in UK auction houses never put the reserve price on every artwork for sale. This result is proved by a 0.43 correlation coefficient at a 10% p-value which clearly demonstrates how there is such relationship between the presence of the reserve price in every lot and the totality of the sample in Italy.

The third one is the one at the intersection between the ITA row and the Q4 column. It indicates that in Italy auction houses always base the pre-sale estimates on market trends alongside aesthetical criteria. By contrast, auction houses in UK tend to provide pre-sale estimates 50% of the times based on personal opinions of the auction house specialists. This result is proved by a 0.59 correlation coefficient at a 5% p-value. The high level of significance of this latter case is a clear piece of evidence of the fact that

in Italy pre-sale estimates are only produced through the analysis of market trends alongside aesthetical criteria of each artwork.

In general, we can assume that the data provided here strengthens the results of our questionnaire we have already discussed. Moreover, it is important to notice that we purposely avoided to analyse in this way Q2 and Q7 because of the contemporary presence of several values for both queries. In fact, we believe that it would be misleading and poor of interest to analyse whether a correlation with Q2, Q7 and the other questions exists.

5 Conclusion

In this work we have presented an analysis of the theory behind art auctions. Furthermore, we also proposed an empirical study aimed to check to what extent the theory provided is considered by auction houses in both Italy and UK.

What comes up from our research is that the studies done thus far about art auctions are only partially consistent with the reality.

In particular, regarding the four questions that directly follow from the papers analysed in Chapter 3, it is proved that the specific value of 70% at which the reserve price should be set, is not considered as an important value through which fight the unexpected price movements. Indeed, auction houses tend to have several levels at which set the reserve price. In particular, most of the times, regardless of the country of provenance of the auction house, the reserve price is at the low estimate. This result is pivotal for the comprehension of the next conclusion, as this is how bidders can know indirectly the amount of the reserve price

Moreover, the fact that the amount of the reserve price is always unknown or sometimes known indirectly, as said above, in both Italy and UK is a clear signal that what Vincent (1995) claims is considered and, particularly, part of the "general rules" that we mentioned in Chapter 1.

Furthermore, the characteristic of British auction house to provide pre-sale estimates that come from personal opinions of the auction house specialists might be a piece of evidence of the fact that what stated by Bawens and Ginsburg (2000) is proved in our study as well. However, it is to be said that the information we obtained through our questionnaire still encompasses some subjective criteria along with objective ones in both Italy and UK. This means that is not to be considered fully rejected to state that the estimates are absolutely unbiased.

Finally, it is worth noticing that the variety of strategies adopted by auction houses in both Italy and UK is an important proof of the fact that they fear a piece of art may fail at auction and then have its future hammer price negatively affected. In this extent, it is assumable that auction houses consider, even unwillingly, what claim Ashenfelter and Graddy (2008) in this regard. In fact, this was already cited in Chapter 1, where we explained that auction houses have always been aware of the fact that an artwork that fails at sale will have lower revenues in the future.

However, it is important to notice that sometimes such studies are made through a fictional framework. In reality, the heterogeneity of the bidders, their rationality and their purposes inevitably influence their behaviour at auction and, consequently, auction houses behaviour. This leads to the chasm between theory and practice that we have just highlighted. Indeed, our questionnaire stressed the importance of such diversity amid the bidders and how this imposes to auction houses to assume behaviours that do not always follow directly what we demonstrated through the academic papers we analysed. Moreover, it important to say that the structural diversities existent, between Italy and UK, affect what the adoptable strategies are. We have made evident such diversities, in terms of behaviour auction houses have in general and in the relationship with the seller, when this was relevant in order to fully comprehend our work.

In conclusion, complying to what stated in our work, another survey worth doing would be to present a similar questionnaire to the "Big Four", in order to demonstrate whether our results are applicable to them as well, then to the entire industry, or they behave in a completely different way, as we thought.

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