

Department of Management Chair of International Marketing

OVERBIDDING IN ONLINE AUCTIONS: HOW TIME PRESSURE AND DENOMINATION EFFECT INFLUENCE THE BID DECISION PROCESS

SUPERVISOR

Prof. Costabile Michele

CANDIDATE

Sanchietti Claudia

Student No. 666511

CO-SUPERVISOR

Prof. Marcati Alberto

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CHAPTER 1: INTRODUCTION

Economic literature assumes that bidders think rationally and behave calmly. However, this is not always the case¹. A myriad of studies has been done regarding human behaviours. Since the first, in 1995, online auctions have become increasingly popular and researchers became more and more interested in understanding bidders' behaviours.

One of the firsts study by Malhotra and Murnighan (2000) reported the results of cows auction. The auctioneer provided an average estimate of \$3,217 for the 75 cows on the Internet auction and an average of \$4,081 for the 65 cows at the live auction. The average final price for a cow on the Internet auction was \$18,051 and the average final price for a cow at the live auction was \$32,300. On average, sale prices were 575% and 791% higher of the Internet and live estimates respectively.

The rational theory predicts that bidders would set a strategic limit an and they would never bid past their true reservation price for an item. Some studies show that people participating in online auctions perceived them more as a game rather than a purchase. In this game they feel competition and pressure resulting in a propensity to bid more than their willingness to pay. As can be seen from this example, some bidders behave in ways that economic theory does not predict.

The current work analyses two potential variables that switch consumers rational behaviours to irrationals, trying to enlarge the literature by exploring a new field.

¹ Ku Gillian (2000).

1.1 Evidences of irrational behaviour in online auctions

Several studies show the irrational behaviour of bidders in online auction. Irrational behaviour in this field can be explained in the way that due to emotions and excitement, people are willing to pay more than what they think "fair" price is. The action of bidding more than is own willingness to pay is known as overbidding.

A clear example is reported in the Matthew T. Jones (2011) research: in 41.1% of 506 auctions they studied, the winning price exceeded the face value, which is an upper bound for rational bidding. Reasons of this misbehaviour are infinite. On one hand, researchers found "physical" variables that influences it, like the auction design, web-site design, colours or images. On the other hand, endowment effect, auction fever, time pressure, social competition (and others)² are recognized as main factors influencing bidders' behaviours. All this circumstances change the perception of the item sold at the auction, and modify feelings and emotions of bidders.

In an interesting study about emotional bidding, Adam et al. (2011) differentiated emotions felt in online auction in "immediate emotion" and "expected emotions". Immediate emotions are direct responses to relevant auction events or outcomes; like a burst of anger when learning about having lost an auction. Instead, expected emotions are related to the anticipation of an auction outcome, like expected regret or expected joy of winning. Both immediate and expected emotions influence the present bidder mood, and as a consequence, his actions. Authors underline that all kind of emotions fuel arousal. Arousal can have a negative impact on decision-making process and on outcomes. Mano (1992) demonstrated that higher arousal led to higher risk-taking, which was expressed as higher willingness-to-pay for lotteries.

Arousal can be fuelled by many factors; Wofford (2001) has shown that time pressure increases physiological arousal, social competition (e.g. the perceived presence of other competitors) is emphasized by web sites through the bid history, the current bidder provoking an increase in heart rate³, time pressure boosts arousal by putting people under the condition to make quick decisions. Loewenstein, et al. (1997) found that physiological

² Others such as social facilitation, anchoring bias, desire to win, experience, escalation of commitment, number of bidders and rivalry.

³ Adam Marc T. P., Krämer Jan, Muller Marius B. (2015).

arousal leads to particularly aggressive decision making with limited attention to costs and benefits.

Often previous researches pinpoint arousal as the main component of auction fever. There is no a unique definition although Adam et al. (2015) identified two distinct characteristics of auction fever. First, under auction fever bidders experience an intense emotional state, and second, auction fever is associated with irrational bids and higher prices in ascending auctions⁴. Murnighan (2002) gave his emotional definition: [Auction fever happen when] adrenaline starts to rush, emotions block the ability to think clearly, and bidders end up bidding much more than they ever envisioned. Other definitions will be given further.

⁴ Adam Marc T. P., Krämer Jan, Muller Marius B. (2015).

1.2 Purpose of the study

Evidences on irrational behaviour show that some individuals act differently compare to what they think. In the large biases basket that influences overbidding phenomenon this research will focus on the following variables: time pressure and denomination effect. Time pressure has to be intended as the perceived need or desire to make judgments or decisions quickly⁵. Instead, denomination effect has to be interpreted as a small quantity of money to be added to an amount. Raghubir and Srivastava (2009) define the denomination effect as "the likelihood of spending is lower when an equivalent sum of money is represented by a single large denomination relative to many smaller denominations."

This research investigates the impact of these two potential reasons of overbidding behaviours, experiments are conducted to reach the goal. The focus will be on a (simulated) online ascending auction of an eight Gigabyte pen drive.

The aim of this research is to provide evidences of irrational behaviour in online auctions. Specifically, I am going to investigate whether there is a correlation between the two variables and the bidding behaviour in online auctions. These variables will be examined separately and together to understand better their effect on overbidding behaviour. In my empirical analysis, time pressure will be analysed in the way that is possible to perceive the very close end of the auction, denomination will be investigate in the way that small or high increment influence the propensity to bid. In that way the bidders' behaviour will be analysed.

The purpose of this study is to provide a systematic examination of how time pressure and small increments affect both the propensity to overbid and the magnitude of overbidding, which no previous studies have simultaneously considered.

⁵ Carnevale, P. J. D., & Lawler, E. J. (1987).

1.3 Significance of the study

In the literature, time pressure has always been studied with the "auction fever", except for El-Haji, Krawczyk, Sylwestrzak and Zawojska's (2016) field experiment in which they declared they are the first that manipulates time pressure exogenously to investigate its impact on bidding behaviour. Moreover, to my knowledge, this is the first study that investigate the denomination effect in auctions. Previously researches⁶ focused only on the purchase decisions and shown that people tend to spend more when using payment modes different from cash, such as credit cards or, applied to the present time *virtual* money such as PayPal. These payment methods are the most common in online auctions and I consider interesting their study.

Through this experimentation, I hope to provide interesting results on the bidders' misbehave in online auction due to time pressure and denomination effect. If the results confirm my predictions, new study possibilities in this field will be opened.

The research is organized as follow: In Chapter 2, literature on online auction, overbidding and biases that influence the bids, will be examined. In Chapter 3, the hypothesis of my study will be developed. In Chapter 4, an overview of the studies I made to investigate the overbidding process related to time pressure and "small increments" will be provided. In the end, the study will be summarized, managerial implications and directions for future researches will be provided.

⁶ Raghubir, P., Srivastava, J., (2008).

CHAPTER 2: LITERATURE REVIEW

2.1 Auctions

An auction is a market institution with an explicit set of rules determining resource allocation and prices on the basis of bids from the market participants⁷. Online auctions differ from live auctions for several aspects; in live auction the physical presence is required⁸, the number of bidders is limited as also the number of the items sold. In live auction an auctioneer proposes an offer and bidders can accept or not, in an online auction bidders submit their valuation for the item.

Despite the differences, we can classify online and traditional auctions in four main categories when a single item is being sold.

First, the *English auctions* (or ascending-bid auctions) are done interactively in real time, the price is raised by bidders until finally only one bidder remains. The essential feature is that at any point in time each bidder knows the level of the current best bid.

Second, the *Dutch auctions* (or descending-bid auctions) are the converse of the English auctions. In these auctions the seller gradually lowers the price from some high initial value until when some bidder accepts and pays the price the auctioneer (or the website) proposed.

Third, in *first-price sealed-bid auctions* bidders submit simultaneously sealed bids and the highest bid is winning the object and the bidder pays the value of his bid. In this type of auction bidders ignore the others' bid and there are no possibilities to submit other bids.

Finally, *second-price sealed-bid auctions* (or Vickrey auctions) have the same mechanism of the first-price sealed-bid auctions with the differences that the highest bidder has to pay. In fact, the highest bidder wins the object and pays the value of the second-highest bid.

Another distinction that can be done is about the bidders' value. The bidders' bid can be public, so all the other bidders know it, or it can be private, so every bidder submit to the auctioneer his bid, but nobody else can have information of the others values. Respectively the bids are labelled common value (CV) or independent private value (IPV)

In addition to these different auction rules, auctions can be dynamic or static. In dynamic auctions, bidders continue to bid until the time ends or only one bidder remains. In the static auctions case, bidders are allowed to submit only one bid and simultaneously to the

⁷ McAfee R.P. and McMillan J. (1987).

⁸ It is possible to call to bid, but a sales representative of the bidder must be where live auction is taking place.

others. Considering all these theoretical kinds of auctions, there is the sharing of their features creating new types of auctions in the real world.

2.1.1 Online auctions

In recent years, online auctions have become popular and successful platforms for conducting a wide spectrum of business transactions. Since they are platforms that erase spatial and temporal, and geographic constraints, online auctions have benefited both sellers and buyers by increasing the pool of potential bidders, decreasing the transaction cost of an auction, and matching demand and supply at the best price at one particular point in time⁹. Unique features of online auction are the availability of information about the buyer such as reputation, or number of items sold and about the product (pictures and prices of similar items on other online stores etc.). In addition to buyer and product's data, online auctions are different from live auction on the ending rules. In traditional ascending auctions once the auctioneer does not receive more offers, closes the auction determining the winner and the price for the item. In online auction we can define two ending rules: fixed deadline or not fixed deadline. If the deadline is fixed (in eBay for example) the potential buyer can see at any time the deadline, that is a specified hour at a specific day. If the deadline is not fixed (such as in Amazon.com) the auction ends only when a prespecified number of minutes have passed without a bid. The different ending rules paved the way to study the bidding behaviour and the most appropriate strategies. In their study Ariely, Ockenfels and Roth (2005) demonstrated that the difference in ending rules between eBay and Amazon is sufficient to cause the patterns of behaviour; there is much more late bidding with the eBay fixed ending rule than with the Amazon automatic extension rule, and that this tendency increases with experience.

Described briefly, the eBay auction is a combination of an English auction and secondprice auction. It means that who offers the highest bid will win the auction (English model) but he will pay the second highest bid plus a minimum increment (second-price model). Moreover, as I said before eBay has a fixed closing time. Buyers interested in participate in the auction can bid their maximum willingness to pay (hidden to the other bidders), as recommended by eBay, or can "click" on the button of the minimum bid (the closest

⁹Walley Matthew J.C. and Fortin David R. (2005).

amount to offer) that eBay specifies. In the first case, eBay uses a proxy bidding system that automatically submits bids on their behalf until their declared maximum bid. The current research will focus on a particular type of auction; an online ascending-bid auction, with a hard closing rule, in which each participant knows the maximum bid and the history of bids.

2.2 Overbidding definition

The winning bid is often based on an overestimation of the item's true value. When in an auction only one bidder left means that nobody else valuate the item more than the highest bid, so the highest bid does not correspond with the market value of the item. The auction winner often overpays. This circumstance is known as overbidding.

There are two schools in defining overbid phenomenon: The former focuses on the bidder willingness to pay, the latest spotlights on the market value on the item sold. Literature gives different definitions; "overbidding occurs when a consumer states that a good is worth more than the true economic value of the good to him"¹⁰. Applied to auctions it means there is overbid when bids that exceed the bidder's value. Overbidding occurs if for example the maximum you will like to pay is 10 Euros, and you bid, or valuing the item 12 Euros (due to changes in good perception).

On the other hand, a more objective definition of overbidding; Delgado and others (2008) explaining it using Nash equilibrium; Defining a buyer's bid function (or strategy) as a map of all the possible value that bidder places on the good for sale to the bid. A set of bidding functions is considered to be an equilibrium if, given the strategy used by one's opponents, no bidder has any incentive to change his or her bidding strategy. In other words, given the value of the good for sale they submit bids that are too high; this is overbidding.

For what concerns this research the definition of overbidding will be the objective one. Therefore, it has to be intended as "placing bids that exceed the face value of the item". This definition is particular important because in an online contest, looking for and contrasting different products is extremely easy (and fast); due to this simple comparison it might be possible thinking that there are few overbidding episodes. In the following pages I will show that overbid in online auction occurs very often and I will give explanations of most of the variables that literature identifies as reasons of overbidding behaviour.

¹⁰ Posavac Steven S. (2001).

2.3 Main variables influencing overbidding

The extant literature finds that bidders may not be intent on purely maximizing net surplus, but may instead be motivated by additional factors. There have been hundreds of papers reporting experimental works on variables that influence overbidding. In the following paragraphs I will give to the reader an overview of all the possible explanations of overbidding behaviour and then, I will focus more on what I consider the most important reasons of overbidding. Moreover, the variables can be split in two different groups, labelled *factual data* and *emotional responses*.

In the factual data category are contained unbiased reasons. Feng, Scott and Sivakumar (2016) bring out variables such as bidders' inexperience, number of bidders and the starting price. In their paper they pinpoint that past experiences can help consumers to identify bidding strategies that result in larger expected surplus and can enable their learning to avoid bidding errors, then a customer's total experience reduces the probability and magnitude of overbidding. Regarding the number of bidders, literature underlines how the perception of the value of an item depends on the valuation of the others, with the follow result: the higher the number of the bidders the higher the value of the item.

For what concerns the emotional responses category researchers found many reasons to overbid. All of them, as they are an emotional response of playing the auction game, influence the bidders' emotional state. The objective number of bidders causes the perception of a competitive situation. Ku (2000) argued that competitive situations are composed of two social factors: rivalry and social facilitation. Rivalry is an emotional response that is accompanied by a desire to win, and as reported by Allport (1924) rivalry is a kind of mild anger which modifies the struggle reaction. Internet auction sites boost the degree of social competition among the bidders by highlighting the presence of other human bidders and their offers. Social facilitation is the presence of the others, either as an audience or as co-actors. The mere fact that there are observers can affect task performance. Hence the desire to beat rivals and to do not do a bad impression on the others can lead auction participants to pay more than their valuation for the item.

Then we can identify two sides of the same coin; fear of losing and joy of winning. Both operate in the same direction. Bidders when participate in auction, as reported by Adam et al. (2011), have immediate and expected emotions. Bidders would imagine both positive

and negative outcomes anticipating the emotions. They would feel joy, happiness and euphoria in the positive outcome, while in the opposite case, their emotions would be madness, frustration and sadness. During the auction bidders have the perception of winning or losing the auction by being the highest bidder or not. Anticipating future emotions can lead to bid more as they would like to feel happy or to not feel frustrated.

The last variable I want to mention is labelled escalation of commitment. It stems from the psychological inability to ignore sunk costs¹¹. It means that a bidder who already participated in the bidding process will be more willing to continue his bidding because of sunk costs (for example the time and the effort invested in the bidding process).

2.3.1 Endowment effect

During the course of the auction, bidders may develop a sense of ownership of the auction item that inflates the utility they obtain from winning that item¹². In 1984, Knetsch and Sinden demonstrated this sense of ownership in their experiment. They gave lottery ticket or 2,00\$ to participants and after few days was offered to each subject an opportunity to trade the lottery ticket for the money, or vice versa. The result was that very few subjects chose to switch and it appears that participant having lottery tickets seemed to like them better than those who were given money.

Thaler (1980) introduced the term "endowment effect" for the observation that a human decision-maker usually values a commodity more if one owns the item. The endowment effect indicates that possessing an item, even for a short period of time, may lead to a valuation much higher than would be expected. Individuals who have an item removed from their possession (endowment) view it as loss¹³. Therefore, it is a sense of ownership that bidders develop during an auction, even they are not the owners of the item. Ehrhart and his colleagues (2008), refer the endowment effect to the conjecture that being the high bidder in an ascending auction can make a bidder "feel like already owning the item". Other authors refer approximately to the same effect labelling it in different ways: pseudo-endowment effect or quasi-endowment effect. Indeed, the main distinction is the real possession of the item, rather than a psychological ownership. Ariely and Simonson (2003)

¹¹ Ku Gillian, Malhotra Deepak, Murnighan J. Keith, (2005).

¹² Heyman James E., Orhun Yesim, Ariely Dan (2004).

¹³ Thaler, Richard (1980).

used the term "pseudo-endowment effect" to denote the hypothesized increase in value caused by a person's psychological—as opposed to actual—ownership of the item. They suggested that once an item has become part of a bidder's psychological endowment, if the bidder is subsequently outbid, the attachment to the item may increase one's willingness to bid again to reclaim their lost endowment. Heyman et al. (2004) described quasi-endowment as a sense of ownership that bidders develop during an auction, even though they are not the owners in any common or reasonable sense of the word.

Experimental studies have been done to test the effects of this bias; Heyman, Orhun and Ariely (2004) found the evidence that "quasi-endowment" or a sense of ownership gives rise to the common overbidding behaviour in the ascending auction. Another empirical result is the evidence that online bidding is positively affected by a pseudo-endowment effect¹⁴. Specifically, the bidders who have participated in the auction for longer periods of time are significantly more likely to rebid. On the other hand, List (2003) founds that there is no endowment effect when bidder is highly experienced, suggesting that value disparities in bids are an artefact of the lack of market experience. However, most examinations into the area have found that experience reduces the (pseudo or quasi) endowment effect.

2.3.2 Time pressure

The essential definition of time pressure is: " time pressure is the perceived need or desire to make judgments or decisions quickly"¹⁵. It is well known that time pressure increases the level of arousal and Horgarth (1980) added that it leads people to rely more on heuristics and to fall prey to cognitive biases that would be reflected in changes in behaviours due to the perceived limitation of the time available to make a decision¹⁶. Park, Iyer, and Smith (1989) argued that time pressure influences judgments and choices by restricting the ability of consumers to search for and process information; it means that consumers are more likely to process information when time pressure is low. There is considerable evidence of poor performance and outcomes when participants are faced with completing tasks with

¹⁴ Wolf James R. & Arkes Hal R. & Muhanna Waleed A. (2005).

¹⁵ Carnevale, P. J. D., and E. J. Lawler. (1987).

¹⁶ Hogarth, R. M. (1980). And Cates, M., Wells, B. G., & Thatcher, G. W. (1996). Maule AJ, Hockey GR, Bdzola L. (2000).

time constraints¹⁷. Moreover, under time pressure people is more willing to take risks (e.g. Maule et al. 2000).

In the online auction contest, time pressure acts in the same way. However, little is known about how time pressure moderates the relationship between uncertainty of outcomes and bidding behaviour. The literature on time pressure in the context of auctions is mostly restricted to the phenomenon of auction fever (Section 2.3.5);

It is essential to differentiate between the types of auction as not in all types bidders feel the time pressure. When there is not a hard end, like for example in Amazon.com auctions, bidders not experience the pressure of the ending time, as the auction will end only if no one else bids in 10 minutes. Instead, in auctions with a hard end, so the deadline is fixed, time pressure can influence the bidding process. Auction sites on the Internet frequently put bidders under time pressure or highlight the social competition that is inherent to auctions, with the purpose of giving an exciting shopping experience. For example, eBay sends emails to remember that the deadline is coming and during the last minute of the auction the website shows the ticking clocks in red characters and it is updated every second. On other sites, such as madbid.com, the auctions that are ending soon are displayed on the starting page and their remaining time is highlighted by a red colour. Differences are also clear between ascending and descending auctions; in both cases, empirical results suggest that under time pressure bidders wait longer until they drop out of the auction. In a descending auction, this results in lower final prices. In an ascending auction, this results in higher final prices¹⁸.

In auctions, bidders often have to take snap decisions and respond to auction events within a limited period of time. A person who does not make a bid quickly, risks leaving the item to another bidder.

With respect to time pressure, Ku (2000)¹⁹ denoted: "bidders are highly aroused and unable to think clearly, and since decisions need to be made quickly, bidders keep bidding". Haruvy, Popkowski Leszczyc (2010) analysed data from a local auction site and found that short auctions lead to more jump bidding activity, that is, more aggressive bids and higher prices in comparison to auctions with a longer duration. However, there are few examples

¹⁷ Ku Gillian (2000).

¹⁸ Adam Marc T. P., Krämer Jan, Muller Marius B. (2015).

¹⁹ Ku Gillian (2000).

that contradict these results. El-Haji et al. (2016) in their study (the first analysing the time pressure without considering the auction fever phenomenon), show that in a time pressure situation bidders are not more likely to submit higher bids and eventually do not experiences overbidding. Adam, Kramer and Muller (2015) found that bidders place significantly higher bids in the high time pressure auctions but only in the context of an actual social competition, that is, when the bidders are competing with human opponents rather than with computer opponents.

In this study time pressure will not be analysed neither with auction fever nor with social competition. Instead, time pressure will be stressed alone and in combination with denomination effect to verify that it really influences overbidding behaviour.

2.3.3 Denomination effect and small increments

The principle of descriptive invariance²⁰ suggests that decisions and preferences must to be equal across different presentations of the same item or phenomenon. This has to be true also in the case of money. Different researchers found that consumer spending and saving decisions depend on a specific amount of money is represented. Two suitable examples are given by Gourville (1998) and Mishra et al. (2006). The former showed that people evaluate a transaction more positively when an identical amount of money is framed. He presented the problem in this way; Consumers prefer to pay \$1 per day rather than aggregately (\$365 per year). The latest reported that individuals have lower spending intentions when the denomination of money is large (e.g. one \$100 bill) rather than an equivalent amount of money in smaller denominations (five \$20 bills).

Raghubir and Srivastava (2009) gave this definition: "the denomination effect is a theoretical form of cognitive bias relating to currency, whereby people are less likely to spend larger bills than their equivalent value in smaller bills." Following the Mishra et al. example, they demonstrated that the likelihood of spending is lower when money is represented by a single large denomination (one \$20 bill) relative to when it is represented by many smaller denominations (20 \$1 bills), holding total amount constant, for actual purchase decisions rather than spending intentions.

²⁰ Kahneman, Daniel and Amos Tversky (1979) and Tversky, Amos, Shmuel Sattath, and Paul Slovic (1988).

The same authors have also shown that people tend to spend more when using different payment modes, such as a credit card or a gift certificate, than when using cash.

The idea of linking denomination effect and auctions is motivated by the design of the online auctions. Most of the auction websites give the possibility to the potential bidder to select the bid it recommends, without thinking in the real value of the item. It means that consumers see a big button with written "bid \$10,50", and they have just to click on it. During the auction process, each offer that website suggests has a small increment on the previous bid (\$0,50 -\$1). This amount can be defined irrelevant for 99% of the item sold in auctions. The small increment is not a barrier to stop bidding, instead in my opinion it is an opening to overbidding. In addition, the mechanical movement on clicking is not driven by rational thinking and it allows people to do not understand clearly what they are doing. The aim of the current work is to highlight the importance of this suggested small increments in the overbidding behaviour.

2.3.4 Competitive arousal

Arousal itself has been shown to have systematic effects on decision making: it can hinder effective decision making by restricting attentional capacity, increase the use of simple decision rules and the reliance of previous choices. Arousal can also restrict attentional capacity, tend to increase regularly heart rates before performance time and increase risk taking ²¹.

Auctions have the potential to provide an exciting shopping experience, that is, to evoke emotions and high levels of arousal throughout the auction process. In the Chicago auctions, cows were sold for 575% and 788% above the online and live auctions of the estimated prices. In a survey those bidders explained their overbidding behaviour through high levels of arousal. Another example has been reported by Murninghan (2002). The auction had rules different from the typical format; the highest bidder wins \$20 and pays the amount he bids but the second highest bidder would pay his bid but win nothing. These rules created an incentive to continue bidding to avoid a certain loss. The participants reported their feelings and in particular the winner said "I found myself in a bidding war that seemed to have no end. As the dollars ran up and up, my internal stress level had

²¹ Lewinsohn & Mano (1993) and Mano (1992)

reached a point where I was not thinking clearly about the ramifications about my decision". In both cases arousal played a crucial role in the bidding process.

The competitive arousal model suggests that rivalry, social facilitation, and time pressure elements inherent in auctions—as well as the uniqueness of being first, can fuel bidders' arousal, impair their decision-making, and push them to bid past their limits. More specifically, the competitive arousal model is unique in predicting that bidders will be more likely to exceed their reservation prices, and by greater amounts, when few rather than many other bidders remain (rivalry), particularly at the end of an auction (time pressure)²². Ku, Galinsky and Murnighan (2008) explored whether and how arousal can increase bidding in auctions. Across three manipulations, they found that arousal consistently increased bidding. The authors demonstrated that high stakes and the combination of high stakes and high time pressure increased arousal and bidding. In addition, whether manipulated through the recall of a prior arousing competitive experience or cognitive dissonance, arousal consistently increased interest in an auction item and increased bidding. Moreover, arousal affected bidding by increasing individuals' interests in the auction items. Finally, the competitive arousal model predicted that bidders would be more likely to bid past their limits "in the heat of the moment" when the end of the auction is coming and when rivalry was particularly high among a few remaining bidders.

Often literature identifies arousal as a component of auction fever phenomenon. Auction fever is viewed as bidding over one's pre-selected limit and is often accompanied by increased arousal and auctions are believed to elicit high levels of arousal in the bidders, which can eventually culminate in auction fever²³. In the following section, auction fever will be analysed in a deeper way.

2.3.5 Auction fever

Some authors, such as Ku et al. (2005) define auction fever using overbidding as a key element; "Auction fever is the emotionally charged and frantic behaviour of auction participants that can result in overbidding". At the same time auction fever is another frequently cited reason for overbidding. Auction fever for Park, Kim and Bock (2008)

²² Ku Gillian, Malhotra Deepak, Murnighan J. Keith, (2005).
²³ Ku Gillian (2000) and Adam Marc T. P., Krämer Jan, Muller Marius B. (2015).

implies irrational, emotionally charged overbidding. Auction fever is primarily emotional and people under auction fever's effect can act in an irrational way. Adam et al. (2011) defined auction fever as "an emotional state elicited in the course of one or more auctions that causes a bidder to deviate from an initially chosen bidding strategy". Murnighan (2002), for example, noted that in the heat of the moment, "(the bidders') adrenaline starts to rush, their emotions block their ability to think clearly, and they end up bidding more than they ever envisioned." The term auction fever is used to capture the idea that, even in the absence of any new information, one's personal value for the auction item may be higher at the end of the auction than at the beginning of the auction ²⁴. Therefore, under auction fever, bidding is distorted because the bidders are emotionally aroused and, as you will read in the previous paragraph, it can compromise the rationality in decision making, eventually resulting in paying more.

Some studies²⁵ reported that the phenomenon of auction fever seems to be particularly observed in dynamic auctions, in which a bidder might experience a higher degree of interactivity due to bidder's information update throughout the auction process. Ariely and Simonson (2003) noted that the multi-stage process of dynamic auctions makes consumers "highly involved." The involvement is the link between auction fever and all the variables previously reported in paragraph 2.3. The fact that people invested time and effort in participating the auction, anticipated emotion of the joy of winning, the perception of rivalry, the competitive nature of bidding, the denomination and endowment effects and time pressure are elements that evoke auction fever. Malhotra and Murnighan (2000) argued that competitive arousal, or competition and time pressure together, best explain auction fever. In this research, auction fever will be considered as the consequence of the bidding process, resulting from the interaction of all the analysed variables and that results in overbidding.

²⁴ Feng Cong, Fay Scott & K. Sivakumar (2016).
²⁵ Adam Marc T. P., Krämer Jan, Jähnig Caroline, Seifert Stefan & Weinhardt Christof (2011).

2.4 Literature gap

In this chapter I briefly reviewed some main concepts of online auctions and overbidding behaviour, giving the appropriate background and definition that will be used for this research. Then I analysed most of the variables that influence overbidding, focusing on time pressure and denomination effect that are the drivers used in this dissertation to understand overbidding in online auctions.

Although online auctions and overbidding are largely studied, this research would like to contribute to literature by studying how time pressure and denomination effect affect the bid decision process. Time pressure has always been studied linked to other variables, such as competition, auction fever and social facilitation. The exception is a recent paper of El-Haji et al. (2016) in which authors recognize time pressure as an independent variable that lead to overbidding bias, and they studied though experiments the role of time pressure in online auctions. Denomination effect (i.e., small increments) has never been applied to online auction contest. Online auctions forced consumers to pay with digital money (e.g., Credit Card, PayPal) and denomination effect act in the way that consumers do not valuate virtual money in the same way of real money. Virtual money is deprived of the physicality, they are just number and most of consumers do not unconsciously recognize them as money.

The aim of this work is to contribute to literature in the online auction field, opening possibilities for further studies in considering time pressure itself and recognize the "small increments" as a variable that influences the continuing bidding.

CHAPTER 3: HYPOTESES DEVELOPMENT

The aim of the present chapter is to study the issue-related factors which I believe that can affect bid decision process in online auctions. More in detail, the hypotheses related to time pressure, denomination effect and their combination will be clarified. Both factors are considered variables that push consumers to change their value-perception of the item during the online auction, driving them to consider the object sold as more valuable compared to the previous valuation.

In the following sections the mechanism of how time pressure and denomination effect work both in ordinary life and in online auctions will be described then the useful definition of each factor for the present work will be given and finally the hypothesis will be developed.

3.1 Time pressure hypothesis

3.1.1. Time pressure in ordinary life

In everyday life consumers face the effect of time pressure. When a consumer goes to shopping an increasing amounts of information can create the impression of time pressure by constraining the amount of perceived time available to make evaluation or decisions²⁶. Think for example in the situation in which you read or hear "only for today there is a special offer..." or "sales period". Consumers are every day "under attack" of these kind of stimuli and they know that the offer will not be forever and if they really want that item they have to decide quickly to buy it or not.

The main effect of time pressure in decision under risk reported in the literature is that individuals restrict their information search to certain features of the available options. Numerous studies found that decision makers paid less attention to positive consequences and relatively more attention to negative consequences²⁷. Park, Iyer, and Smith (1989) argued that judgments and choices are influenced by time pressure, by restricting the ability of consumers to search for and process information; consumers are more likely to process information systematically when time pressure is low. In general, there is evidence that

²⁶ Davidson (1989).

²⁷ El-Haji, A.; Krawczyk, M.; Sylwestrzak, M.; Zawojska, E. (2016).

other biases are more pronounced under time pressure²⁸. Similarly, Siemer and Reisenzein (1998) argued that when time pressure is induced, cognitive capacity may be reduced, causing individuals to seek their affective states as a criterion for judgment. At the same time consumers have access to increased amounts of information on products, from not only traditional retail stores but also the Internet, which makes decision making more difficult. Time pressure causes a cognitive discrepancy between the time available and the time required to perform a given task²⁹. In a lottery-laboratory experiment, Jones et al. (2011) showed that decisions under time pressure can be detrimental to decision performance and results in stronger arousal measured by increased heart rate as well as stronger activation of two brain regions that are known to be activated when experiencing affective feelings and making choice selections. Another evidence is given by Dror et al. (1999) that make participants play a version of black jack, in which they had to decide whether to take another card ('the risky option') or not ('the safe option'). They found that the time pressure manipulation caused a polarization effect; when participants felt the time pressure the likelihood of taking another card where higher when it was associated with a low probability of losing. At the same time the likelihood of not taking another card where higher when low time pressure was perceived. Maule et al. (2000) found that, psychologically, time pressure is known for fuelling arousal and increasing the willingness of decision makers to take risks. However, Busemeyer (1985) found the opposite effect; there is a greater willingness to take gambles with positive expected value but lower to take gambles with negative expected value when time pressure is imposed.

Time pressure has to be distinguished from time stress, which involves affective changes that are more intense and negative in nature³⁰. Time pressure, is defined as the perceived need or desire to make judgments or decisions quickly³¹. Wofford (2001) and Maule et al. (2000) have shown that time pressure increases physiological arousal and it is increases decision-makers' willingness to take risks. Indeed, time pressure is known to increase emotional arousal and allow fewer cognitive deliberations, particularly when evaluating risky options³². Ku (2000) and Adam et al. (2015) identifies arousal as a component of

²⁸ Hogarth (1980) and Kruglanski and Freund (1983)

²⁹ Hornik (1984)

³⁰ Maule, A. J. and Hockey, G. R. J. (1993).

³¹ Carnevale & Lawler (1987) and Pruitt (1981)

³² Ordóñez and Benson (1997)

auction fever that, as we saw in Chapter 2, can provoke overbidding in the online auction contest.

Ultimately, time pressure is the perceived limitation of the time available to make a decision and it can influence consumers' behaviour.

3.1.2. Time pressure in online auctions

The literature on time pressure in the context of auctions is mostly restricted to the auction fever phenomenon. In this section I will try to extent the literature giving empirical evidences on how time pressure act in online auctions. In the same way I analysed the variables influencing the behaviour in the auction, I will distinguish here between auction types. This *modus operandi* is useful to understand whether, how and when time pressure influences the bid decision process.

Roth and Ockenfels (2002) showed that in auctions with a fixed ending time and date, i.e. hard close auctions a large part of bids is placed within the last 5 min, the reason is that bidders perceive the forthcoming end of the auction and they are forced to decide if bid or not. The strategy of bidding in last minutes or second is known as sniping; bidding at the end of the auction ensure a high probability of win, since other bidders will have few seconds to decide whether and how much offer. Sniping is a very used and successful strategy. Moreover, if the auction is taking place in an auction website, such as eBay.com, in which there is the proxy bidding system, bidders can put their maximum amount of money that they want to pay for the item and the website will bid for them in case of he would not be the highest bidder up to their maximum amount. The proxy bid system is recommended by the auction websites, however not all the consumers use it, and this lead to overbidding. Sometime even if the bidder uses the proxy bid system, he continues to raise in the last minutes because he feels himself the owner of the item and the time is finishing. Time pressure exists in auction with hard close end but this is not true in the opposite type of auction, because the remaining time restarts each new bid. Adam et al. (2015) found that bidders' arousal is increased in high time pressure auctions and that this leads to higher bids in ascending auctions. They showed that bidders' arousal levels are significantly higher in auctions with high time pressure and that bidders place significantly higher bids in the high time pressure auctions. Vickrey (1961) affirms that there is no

difference between static or dynamic auctions in terms of time pressure. However, most recent researches showed that static and dynamic auctions yield different outcomes. The phenomenon of auction fever occurs only in dynamic auctions and time pressure is an important factor that drives decision making in auctions³³.

On the other hand, the time pressure in descending clock auctions leads bidder to submit lower bids. Katok and Kwasnica (2008) in their paper, studied impact of time pressure in descending clock auctions, founding that bidders place lower bids under time pressure. Similarly, Cheema, Chakravarti, and Sinha (2012) found that time pressure can result in lower bids in descending auctions while it has the opposite effect in ascending auctions. It is vital to underline that in both cases, under time pressure, bidders wait longer until they drop out of the auction. Hence, with respect to final prices they found that time pressure lead to lower final prices in descending auction and the opposite in the ascending one.

Connecting time pressure and arousal Ku et al. (2008) showed that the self-reported levels of arousal are higher in high time pressure auctions than without time pressure in both ascending or descending auctions.

Resuming, time pressure does not affect all the auctions. To instigate the pressure of the time the auctions have to be dynamic, with hard close end and ascending-bid (i.e. English auctions).

³³ Park et al. (2012) and Cox, Roberson, and Smith (1982).

3.1.3 Definition and hypothesis of time pressure

In previous paragraphs we investigated how time pressure affect the human being both in everyday life and online auction. It is necessary now, to give a definition of time pressure and develop the useful hypothesis for the current investigation.

With respect to time pressure, Ku (2000) denoted: "bidders are highly aroused and unable to think clearly, and since decisions need to be made quickly, bidders keep bidding".: Time pressure is known for fuelling arousal and increasing the willingness of decision makers to take risks³⁴.

Mixing up all the different definitions the one useful for this work is the following: time pressure, through the perception of the limited time available, influences judgments and choices by increasing physiological arousal that which in turn restricts the ability of consumers to make a rational decision and increases their willingness to take risks.

In online auctions, bidders are required to make snap decisions and place bids quickly. A bidder who does not make a bid quickly risks to leave the item to another bidder. Thus, bidders are more likely to rely on simpler cognitive modes and heuristics, when they perceive time pressure, to make less than optimal decisions. Bidders are highly aroused and unable to think clearly, and since decisions need to be made quickly, bidders keep bidding. In conclusion, through this study I want to verify whether time pressure influences the bidding behaviour in online auctions. Hence, my first research hypothesis states:

HP 1. Under the influence of higher time pressure levels, bidders place higher bids in ascending clock auctions with a hard close end, eventually resulting in overbidding.

³⁴ Maule et al. 2000

3.2 Denomination effect hypothesis

Some researchers found that consumer spending and saving decisions depend on a specific amount of money is represented. Gourville (1998) reported that consumers prefer to pay \$1 per day rather than aggregately (\$365 per year). In 2009, Raghubir and Srivastava formalized this behaviour, as a theoretical form of cognitive bias. They provide a definition of this deviation from rationality in judgment; "The denomination effect is a theoretical form of cognitive bias relating to currency, whereby people are less likely to spend larger bills than their equivalent value in smaller bills."

As reported in Chapter 2, there are no evidences in literature on whether, how and when the denomination effect (i.e. small increment) influences the bid decision process. Despite the absence of empirical data, the current research tries to fill this gap with experimental analyses.

Online auctions are designed in order to stimulate consumers to take part in auctions, with the purpose of giving an exciting shopping experience: colours, images, charming items description, ease of use, feedback system, possibility to ask to seller (...) are elements that encourage people to bid. Moreover, in the majority of the cases it is possible to pay a won auction, with credit card o other electronic payments methods. Mishra et al. (2006). have demonstrated that people tend to spend more when using payment modes different from cash, such as a credit card or a gift certificate. These are the main reasons of the idea of linking denomination effect and auctions. Since most of the auction websites give the possibility to the potential bidder to select the "recommended" bid, people can be simplified in the decision process of bidding or not. The recommended bid is often a very small increment respect to the previous bid (starting from $0.05 \$ up to $10 \$ depending on the auction starting price) and consumers could be psychologically pushed to select the recommended bid, just considering the increment so much small that bidding would be worthwhile. Moreover, in the moment of bidding in online auctions, consumers have just to click on one button, so psychologically they are not buying, because they are not bringing out their pickpocket or touching their money. When consumers buy online they do not think in the real value of the item; they have not the perception of spending money. Another shortcut that occurs in humans' brain is related to the small increments. When

someone had just bid and his offer has become overpassed the auction website proposes another "recommended" bid that is a very small increment in compare to the previous bid. In the consumers' mind this small increment is not a barrier to stop bidding, instead it is clearly an opening to overbidding. Once a bidders decided to bid 10\$, and he has to rebid offering 11\$ or 12\$ could be insignificant as in his mind because he already paid 10\$ for the item, and he just have to add 1\$ or 2\$. This process could carry on until the auction ends and bidders could arrive to spend much more money than they planned. Moreover, the mechanical movement on clicking is not driven by rational thinking and it is faster than bring out the pickpocket and count the money that allows people to do not understand clearly that they are paying.

The aim of the current work is to discover and highlight the importance of this suggested small increments in the overbidding behaviour. Therefore, the second hypothesis states:

HP 2: *The small increment, recommended by the auction website, pushes bidders to bid and continuing bidding, eventually resulting in overbidding.*

3.3 Time pressure combined with denomination effect hypothesis

In previous paragraphs the time pressure and denomination effect have been defined, focused in the everyday life and in the online auction contest and the hypothesis have been exhibited. In this section I will provide the reader the motivations of the combined study of the two factors. It is important to notice that, as there is no previous literature on denomination effect applied to online auction, at the same time there are no empirical evidences on their effect when combined.

Due to the ease of use, accessibility from each corner of the world and the saving online auction have become one of the most important online transaction modes. Often online auction websites try to push consumers to bid using different techniques: a countdown that becomes red in the last minutes of the auction, the number of people that are observing the item (and maybe they will do the bid in the last minute), the number of previous bids and sometimes the nicknames of that bidders, the email notification of the imminent end of the auction, the big button that invite the bidder to offer and so on. In the case we are examining now we focus on the red countdown and the big button that push bidders to bid, due to the small increment compared to the previous offer. The former helps people to remind their selves that time is finishing and that they have to decide quickly whether, how much and when offer. All these choices interact with the rational and linear process that consumers do, because they stress the point that there are few minutes or second remaining and that they have the last opportunity to get the item. The latest, in the eBay.com case is a blue button, with the white writing "place bid". The increments that websites recommend are quite insignificant compared to the final amount. Ultimately potential bidders, when the end of the auction is close, looking at the red countdown and the small "monetary effort" that they have to do in case of placing the bid and winning the auction, they decide to bid. The rational thinking in the few seconds to go of an auction is overwhelmed by the pressure of time and denomination effect, so shortcut happens in consumers' mind pushing them to bid, and bid until the auction ends.

At the same speed of the online auctions grow, there are the biases and heuristics that appeared. Most of them have been analysed in the second chapter of this work but it has not been investigated the magnitude of their effect. Several researches investigate two or more variables both separately and together.

In this section, there is the assumption that the bid decision process of buyers is influenced through (1) time pressure and (2) denomination effect. Each of these is important and has the potential to influence the final result, that is overbidding. Moreover, here I suppose that when both, time pressure and denomination effect are present and perceived by consumers, their combined effect is higher rather than when they stand-alone. With the third analysis I want to illustrate how big is the combined effect of time pressure and denomination effect (i.e. small increments) on the bidding behaviour. Hence, the third hypothesis of the current work is:

HP 3: Under the influence of higher time pressure levels and the small increment recommended by the auction website, bidders place higher bids in ascending clock auctions with a hard close end, eventually resulting in overbidding.

In this Chapter three hypotheses have been identified: time pressure influences bidding behaviour, denomination effect affecting bidding behaviour and their combination that have a higher magnitude than in the case of their separation.

To analyse the effects of the three hypotheses we have got until now, I have conducted an experiment. It was a questionnaire in which the respondent had to declare his willingness to pay an item (USB pen drive) in an online auction. In the following Chapter, I will present it and the relative results.

CHAPTER 4: THE RESEARCH MODEL

In Chapter 3 the hypotheses have been developed. To test the above-mentioned hypotheses, an experiments was developed. The study was used to identify if the time pressure and the small increment were perceived by restricting the available time, in order to analyse the time pressure effect.

In the following paragraphs the experiment will be described and analysed. It is necessary to underline that the questionnaire was submitted to Italians and for this reason it was written in the Italian language. In the Appendix of this dissertation the original version will be provided.

4.1 The study

The aim of this study was to investigate if time pressure and denomination effect affect the bid decision process, eventually resulting in overbidding. It was designed to be as much reliable as possible, trying to find an interesting item to sell. I tested an 8 Gb pen drive, as the auction item sold, and how respondents behave in an as realistic as possible online auction. The experiment had the questionnaire form that was filled online. It was divided in three main parts: instructions, auction simulation and personal information. Questions were of different typologies: 7-point Likert rating scale, multiple choices and open questions.

4.2 Design of the study

The experiment was conducted by using Qualtrics, an online data collection platform. In this platform is possible to design the questionnaire in all the possible ways, mixing different typologies of questions. The experiment was design as a 2x2 matrix in which the variables were time pressure (High, Low) and increment (High, Small). The platform selected randomly one of the four scenarios and submit it to the respondent.

4.2.1 Methodology

The study focused on the willingness to offer of the participants. The questionnaire was divided in three parts: instructions, auction simulation and personal information. The instructions were:

"You need a new pen drive to keep your digital files. You need a pen drive enough capacious but not necessary especial and you do not have a preferred brand. Moreover, you do not have the possibility to reach the closest physical electronic shop and you decide to look at eBay website. Imagine that you find an 8 GB pen drive auction on eBay, and you think that is suitable for you. The auction will end in 25 seconds (or 6 minutes) and the last bid is 7 euros (no shipping costs). You notice that there are other people interested in the same item. You can bid just once in this auction. You decided to take part into the auction and to do your first bid. You notice that the minimum possible raising is 2 Euros (0,20

euros)."

The aims of this part were to be clear participants were going to participate in an auction, they need the 8 GB pen drive and the only option they have is to buy it on internet. Moreover, in each treatment the remaining duration of the auction and the minimum bid they could submit were specified. In the second part, the auction simulation, participants had to declare their willingness to bid the first time, their offer for the second and third raises. In the third part, respondent gender, age, education and occupation were asked.

The experiment was design as a 2x2 matrix in which the variables were time pressure (High, Low) and increment (Large, Small). The platform selected randomly one of the four scenarios and submit it to the respondent. In the High Time Pressure (HTP), people were participating in an auction and the end of this auction was in 25 seconds, instead in the Low Time Pressure (LTP) the auction would end in 6 minutes. In the case High Increment (HI) was selected by the online platform, participant faced the minimum possible bid of 2 Euro, whereas in the case of Small Increment (SI) the minimum bid was of 0,20 Euros. In Table 1 is possible to see the four scenarios.

Table 1: Experiment scenarios

	High Time pressure (HTP)	Low Time pressure (LTP)
Small Increment	Auction ends in 25 seconds/	Auction ends in 6 minutes/
(SI)	minimum bid of 0,20 Euros.	minimum bid of 0,20 Euros.
High Increment	Auction ends in 25 seconds/	Auction ends in 6 minutes/
(HI)	minimum bid of 2,00 Euros	minimum bid of 2,00 Euros

Sample: Participants were invited to fill the questionnaire by social networks or they were asked in the LUISS University. Under any circumstances respondent knew of the questionnaire topic and participants were not informed about the existence of the other treatments. In total, 124 individuals accepted the invitation to answer to the survey, that was run in November 2016. *Qualtrics* platform submitted the scenario High Time Pressure+ High Increment (HTP+HI) to 39 participants, the scenario Low Time Pressure + High Increment (LTP+HI) to 33 respondents, the scenario High Time Pressure+ Small Increment (HTP+SI) to 29 people and 25 participant answered to the scenario High Time Pressure + Small Increment (HTP+SI).

The percentage of males was 50.8 % (N=63) while females were 49.2% (N=61). The distribution of participants across the four treatments and the percentage of male and female in each scenario is shown in figure 1.



Figure 1: Sex of the sample

Participants were from 18 up to 33 years old, the average age was 22,54 years and a standard deviation of 2,82. Education and occupation reflect the average age. In figure 2 it is possible to notice that almost 90% of the respondents have high school and bachelor's degree. Figure 3 shows that 77,42% of the participants are students and 15 % are employed.







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Figure 3: Participants occupation

4.3 Data analysis

The data collected have been analysed through a one-way ANOVA. Below the most important results will be presented.

In the essential part of the questionnaire was asked to respondent their willingness to offer to win the Pen Drive. They had to choose a value between 1= not interests in offer and 7= extremely interested in offer. The results differ from each scenario; in figure 4 it is possible to see in a line the position of each scenario. Considering 4 the average of the 7- point Liker scale as respondent indifference in offer, we can notice that in the scenario LTP+HI the possibility to offer is less attractive (average of 3,12) than the HTP+SI scenario in which the average is 5,88. The intermediate points are very close to the indifferent one (4); HTP+HI with an average valuation of 3,66 and the LTP+SI scenario with an average of 4,11.



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Figure 4: 7-points Likert scale on the willingness to offer

The relation between the different groups were analysed however this analysis demonstrated considerable variance between the four scenarios, it means that the respondents from each group answered in very different ways. The Levene test proved that, as the p-value = 0.09, in the 90% of the cases is not possible to refuse the null hypothesis that the error variance of the dependent variable is equal between groups. Hence there are differences between groups only in the 90% of the cases, it means a wide range of error of 10%. Moreover, the test Between-Subjects Effects (see table 2) shows
that both variables influence the dependent variable (i.e. the willingness to offer). Then, we can underline that the interaction of time and increment is significant since when one variable grows, at the same time the other grows, but they do not act separately; there is a significant effect of their interaction in 90% of the cases (p-value= 0,051).

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	116,564 ^a	3	38,855	13,014	,000,
Interception	2132,177	1	2132,177	714,149	,000
V1 (time)	40,337	1	40,337	13,510	,000
V2 (increment)	78,256	1	78,256	26,211	,000
time * increment	11,626	1	11,626	3,894	,051
Error	358,274	120	2,986		
Total	2556,000	124			
Corrected Total	474,839	123			

Table 2: Test of Between-Subjects Effect

a. R Squared = ,245 (Adjusted R Squared = ,227) Created by the Author

After this test the paired comparison analysis has been done. We tested the differences between the averages of the four different scenarios willingness to pay. Summarizing there is the HTP+SI scenario result of 5,88, the LTP+SI group with an average of 4,11, the HTP+HI with a level of 3,66 and LTP+HI with the lowest level of 3,12. In the table 3, we treated the increment variable as fixed and studied whether time (high time pressure and low time pressure) has an impact related to the increment variable. We can notice that in the case of small increment there is a substantial difference between the two time-treatments. The p-value= 0 means a high statistic relevance, there is the evidence against the null hypothesis that there are no differences between High and Low time pressure, so there is a high difference, in the case of small increment, and a so small p-value means that it is true in 99,99% of the cases. However, we cannot notice this relevance in the high

increment case as the p-value is so high (=0,227) that means there is no correlation between the variables.

Increment	(I) Time	(J) Time	Average difference (I-J)	Standard deviation Error	Sig.	Confidence interval for the difference at 95% (limit	Confidence interval for the difference at 95% (limit
						inferior)	superior)
Small	Time	No	1,772	,447	,000	,886	2,658
increment	pressure	Time					
		pressure					
	No	Time	-1,772	.447	,000	-2,658	-,886
	Time	pressure					
	pressure	-					
High	Time	No	,534	,440	,227	-,337	1,405
increment	pressure	Time					
	_	pressure					
	No	Time	-,534	,440	,227	-1,405	,337
	Time	pressure					
	pressure	-					

Table 3: Paired	comparison
-----------------	------------

After the paired comparison, with the univariate analysis I tried to verify the effect of the variable time on small and high increment by using the variance (even if they are only two groups and actually we are comparing averages). By use this analysis I tried to explain the small increment and high increment variability as a function of time. The result is a significant effect of time so it refuses the null hypothesis that the estimated marginal averages of the groups that have been created on increment are different. It is statistically relevant as the p-value= 0,000 shows that in 99,99% of the cases it is verified. Here again, is not possible to verify the case of high increment as it is not statistic relevant (p-value =0,227). All the results are shown in Table 4.

Table 4:	Univ	ariate	Ana	lysis
----------	------	--------	-----	-------

Increment		Sum of	df	Average	F	Sig.
		squares		of		
				Squares		
Small	Contrast	46,841	1	46,841	15,689	,000
Increment	Error	358,274	120	2,986		
High	Contrast	4,401	1	4,401	1,474	,227
Increment	Error	358,274	120	2,986		

Finally, in the figure 5 it is shown graphically the correlation between the two variables both in the small increment case and in the high increment case. Once again we notice a high interaction of the two variables but only in the case of small increment, instead in the case of high increment there is no correlation between the variables. When the pressure of time is low and the increments are small, consumers are more or less indifferent in offer, but when they start feeling the grow of the pressure of time their willingness to offer increases.



Figure 5:Expected Marginal Averages

After the study of the dependent variable, was asked to respondents the ultimate price to win the 8 Gigabyte pen drive auction. The average ideal price was 9,66 Euros, with some differences between the different scenarios. In figure 6, they are displayed in a monetary-line. The highest valuation is given by the respondent of the High Time Pressure+ Small Increment (HTP+SI) scenario while the lowest by the High Time Pressure+ High Increment (HTP+HI) scenario.



Figure 6: Average ultimate price

Then, there were other questions about an hypothetical second and third raise. It is necessary to underline that before this question, participant had bid their first time; in the case of small increment they bid 0,20 Euros while in the high increment treatments they bid 2 Euros. To each group was asked to submit one of the recommended bid, starting from zero up to 3,50 Euros, and then to specify the exact amount that there are interested in offer.

Table 5: Second and Third raise

	Average of second	Average of the	Average of second	Average of the
	recommended bid	ideal second	recommended bid (1)	ideal third bid(2)
	(1)	bid (2)		
LTP/HI	0.55	0.71	0.29	0.35
HTP/HI	0.56	0.79	0.44	0.45
LTP/SI	0.74	1.09	0.5	0.61
HTP/SI	0.81	1.67	0.99	1.98

(1)Participants had to choose between 7 options

(2) Participants had to write their offer

The numbers is the table are in Euros

From Table 5, we can notice that in the cases of the High Increment, the Averages of both recommended and ideal bid are significantly below the small increment treatments. Moreover, is vital to accentuate the fact that in the case of High Time Pressure+ Small Increment (HTP+SI) the ideal bid is two times the recommended bid both in the second and third raise, in which it reaches 1,98 Euros. This preliminary study of the hypothetical raises is useful to understand if the overbidding phenomenon occurs. In Table 6, the cumulative price that on average each group reached is shown. The results of whether overbid happened are displayed in the last column. There is just one case in which there is no overbidding; Low Time Pressure + Small Increment. We can notice that the case in which the magnitudo (i.e. the difference between the average ideal price and the final price resulting by the sum of all the bids) is higher and equal to 0,96 Euros.

	Α	В	С	D	Ε		
	Auction	Increment	A + B +	C +	Average	Overbid/	D - E
	Starting	(Small/	Average	Average	of ideal	No	Magnitudo
	point	High)	of ideal	of ideal	price by	Overbid	of
			second	Third	groups		overbidding
			bid	bid			
LTP/HI	7,00	2,00	9,71	10,06	9,56	Overbid	0,50
HTP/HI	7,00	2,00	9,79	10,23	9,27	Overbid	0,96
LTP/SI	7,00	0,20	8,29	8,90	9,77	No	
						Overbid	
HTP/SI	7,00	0,20	8,87	10,85	10,03	Overbid	0,82

Table 6: Overbidding and Magnitudo of Overbidding

(The number are prices in Euros)

In next session the results will be analysed and the assessment will be provided.

4.4 Results and assessment

The experiment that has been proposed, analysed the interaction between the Time Pressure variable and Increment variable. Consistently with existing literature the experiment provided the result that time influences the decision process in the online auctions contest. However this was not the primary object of this research. The experiment that I have made includes a variable that, for my knowledge, no one else investigated before in the online auctions contest; increments. In particular two of the hypotheses of this thesis was that the small increment influences the bids in auction and that the interaction between a perceived High Time Pressure combined with Small Increment results in a higher effect.

Surely, it is possible to underline that the interaction of time and increment is significant since when one variable increases at the same time the other variable grows. Moreover, the different analysis showed that the interaction of the two variables is valuable but only in the case of the small increment, while the same thing is not valuable for the high increment case. However, when participants had to declare their second and third offers the average of the bids is higher in the case of small increments, with a peak of 1,98 Euros in the third offer of the High Time Pressure + Small Increment scenario. Although the offers were high, in three scenarios we experienced overbidding. Hence, the final price (i.e. resulting by the sum of all the bids) is higher than the average ideal price to win the auction.

In conclusion, I am neither completely satisfied nor completely unsatisfied by these results. With the current results it is possible to affirm that there is a significant interaction between time pressure and small increments, however the case of combined High Time Pressure and Small increment is not the only case in which bidders experience overbidding, neither the case in which the overbidding phenomenon is more pronounced. The current research has some limitations that could be improved to get an overall understanding of the overbidding phenomenon. In the following chapter, I will explain the limitations of this work, giving some suggestions for managers and for future researches on this topic.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 Overview of dissertation

The first chapter that was covered in the thesis was the Introduction. In the beginning of the chapter we have analysed the background of the study and the reasons behind the research field and topic. We found lots of evidences of irrational behaviour in online auctions; very often the winning price exceeds the face value of the item sold in the auction. This could happen through the immediate emotions and the anticipation of the expected emotion that, combined with other factors lead to arousal that can have a negative impact on decision-making process. Later on, the purpose of the study was clarified, hence although the basket of biases that influences overbidding phenomenon is wide this study focuses on two variables: Time Pressure and Denomination Effect. The aim of this research was to investigate whether there is a correlation between the two variables and the bidding behaviour in online auctions. Lastly the purpose and significance of the study were presented. No previous researcher identified the Denomination Effect as a potential variable for affecting bidding behaviour, neither alone nor with other potential factors.

The second chapter of the paper is the Literature Review. At the beginning of the chapter auctions and auction types and the differences between traditional (i.e., live) auctions and online auctions were explained to give an overview of the contest to the reader and to focus better the research. Indeed, the online auction characteristics of this study were explained. The research focuses on online ascending-bid auction, with a hard closing rule, in which each participant knows the maximum bid and the history of bids. Later on the Chapter, we saw all the literature that concerns the topic of the dissertation; overbidding. Even if literature give different definitions of this phenomenon the suitable for this study is: "overbidding happen when bidders place bids that exceed the face value of the item". Then we investigate the triggers of the overbidding behaviour. We divided them into two main categories: factual data and emotional responses. A brief list of them: past experiences, number of bidders, playing the auction game, rivalry and social competition, social facilitation, fear of losing and joy of winning, escalation of commitment and endowment effect. After we introduced the key elements of the theoretical findings essential for the research; time pressure and denomination effect. They were examined from the literature point of view and then extended to the present work. Bidders often have to take snap

decisions and respond to auction events within a limited period of time. A person who does not make a bid quickly, risks leaving the item to another bidder. This create an incentive to bid and to bid more than its own maximum willingness to pay; the effect of time pressure. On the other hand, Denomination Effect was never studied in the (online) auction contest. The small recommended increments in bids affect the bidding behaviours and process. Afterward, since these variables do not affect the overbidding behaviour directly, competitive arousal and auction fever were analysed. Literature explained that auctions have the potential to provide an exciting shopping experience and the above-mentioned variables can fuel bidders' arousal, impair their decision-making, and push them to bid past their limits. Arousal is an emotional state that, elicited in the course of one or more auctions, causes a bidder to deviate from an initially chosen bidding strategy that eventually can result in overbidding. Leaning towards the end of the chapter, it was explained the gap in the literature and which are the improvement to it of this dissertation. Time pressure has always been studied combined with other variables, while Denomination effect have never been applied to online auction contest.

The third chapter covered the Hypotheses Development. In this chapter we have examined the hypotheses related to time pressure, denomination effect and their combination. Both factors are considered variables that push consumers to change their value-perception of the item during the online auction, driving them to consider the object sold as more valuable compared to the previous valuation.

We discovered how time pressure and denomination effect work both in ordinary life and in online auctions. We gave the suitable definitions for this research and we identified three hypotheses:

HP 1. Under the influence of higher time pressure levels, bidders place higher bids in ascending clock auctions with a hard close end, eventually resulting in overbidding.

HP 2: *The small increment, recommended by the auction website, pushes bidders to bid and continuing bidding, eventually resulting in overbidding.*

HP 3: Under the influence of higher time pressure levels and the small increment recommended by the auction website, bidders place higher bids in ascending clock auctions with a hard close end, eventually resulting in overbidding.

The expected results were that the scenario of the combination of high time pressure and small increment would be the case in which the majority of overbidding cases happened, while the opposite, when consumers do not perceive the time pressure and the increments are high, would give the reverse result.

The fourth chapter was on the experimental research. In this chapter the experiment methodology, sample and result were explained. The experiment was a questionnaire using the online platform *Qualtrics*, in which four scenarios were created by using a 2x2 matrix in which the variables were time pressure (High, Low) and increment (Large, Small). The platform selected randomly one of the four scenarios and submitted it to the respondent. The sample of the research was 124 people perfectly divided between males and females. The findings of the research are quite satisfying. There is an evidence of the interaction between the two variables. In the particular case of small increment we found that the pressure of time influences the willingness to offer. As the time decreases the willingness to bid. However, the findings on the overbidding phenomenon are not so relevant as in three of four scenarios overbidding happens. Reasons of that could be explained by some limitations that this research has.

Finally, we arrived in the last chapter that is named Discussion and Conclusion we examined the findings from the research. In the former part we are summarizing the work. After this, we will focus on the implications that are relevant and managers. Then, we will consider the limitations of the study and tips for future works on the same topic. In the part of limitations, we will go through a wide range of problems from the sample and the method of the experiment to the no consideration of all the possible variables. In the future research paragraph, we will take into consideration the topics that were not examined properly, or have been neglected and some tips regarding the possible improvements that can be done. In the end the main part of the thesis, the conclusion of the paper will be developed.

5.2 Managerial implications

Literature on behaviours in online auctions is wide, however, to my knowledge, there are no studies on the denomination effect applied to this contest. This study is the first to examine the denomination effect and its impact combined to time pressure on customers' behaviour in online auctions. In addition, I identified several variables that significantly affect the customers' behaviour in bid decision process of an online auction, yielding important managerial implications for sellers and owner of electronic auction websites.

First, my empirical results show that, denomination effect plays an important role in decision making in online auctions; customers willingness to offer in an online auction is positively associated with the small increments. Moreover, when the remaining time in an online auction is little people tend to bid more. According to this analysis and the evidences that literature gives on the sniping behaviour (i.e. bidding in the last minutes of the auction) the auctions sellers should do the auctions with a limited period of time; for example eBay.com website lets the sellers choose the auction duration of 1-3-5-7 or 10 days. I recommend to create shorter auctions (1-2 days) in order to reduce the available time and give the perception of time pressure since the first moment. In this way bidders will not forget of the auction and they will be more pushed in taking part in the auction and continuing bidding.

The current research, in line with the previous literature, finds that variables such as time pressure and small increments, as well as escalation of commitment, endowment effect and rivalry, have a strong impact on the bidding behaviour eventually resulting in overbidding. Online auction managers should put more attention on the factors the provoke these behaviour in the manner to push bidders to be more attracted and involved in online auctions. I suggest to create a capturing auction design in which consumers perceive the auction as a game, to create a competitive space in which bidders feel the pressure of rivalry and at the same time remind them the scarcity of the time and the possibility to bid small amount of money. Designing an auction considering all the variables that influences the bid decision process, could push consumers to bid and to remain more time into the auction, resulting in higher revenues for the seller and simultaneously higher profits for the auction website's company.

Moreover the auction websites' owners could stress the point of the limited time and small increments to offer, by sending mails or notification to potential bidders or previous bidders. This message should underline the short time available to offer and the possibility to offer a small amount of money. An example of reminder could be: "Only 5 minutes left to get the item. Bid 0,50 Euros and you will increase your possibilities to win the auction". This research is only a first attempt in the study of the correlation between time pressure and denomination effect bidders' behaviour in online auctions, and it has some limitations. Even though this topic is still unknown, this work opens to new field studies that could be done by improving the limitations that the current research faced. I suggest a deeper analysis of the phenomenon and to care about factors that pushes bidders to bid in online auctions.

In the following sections limitations will be reveal and some tips will be provided.

5.3 Limitation of the research

This study has several limitations that further research could address. In the extant literature, time pressure has always been studied with auction fever phenomenon, and auction fever has been identified as the primary cause for overbidding. Nevertheless, time pressure is a crucial factor that provokes arousal in bidders, which in turns provokes auction fever and consequently overbidding. In fact, Ku (2000) identified auction fever as "bidding over one's pre-selected limit and is often accompanied by increased arousal and auctions are believed to elicit high levels of arousal in the bidders, which can eventually culminate in auction fever".

Thus, several factors affected the validity of the current research.

First, this study represents a first attempt to apply the denomination effect to online auction; until now, no one has tried to study whether the small increments that auction websites recommended could play some role in the bid decision process.

Second, the bidding decisions were modelled based on an assumption that was limited to two conditions (high and low) of time pressure. I tried to make as smaller as possible this problem by model the experiment to the auction format and just changing the time in terms of left minutes. However, in this research, only one type of auctions has been considered; the ascending-bid auction with a hard close end.

Third, although all the previous literature on behaviour in online auctions analysed them through practical test, such as simulation of real auctions or verifying hearth rate and brain areas, in this research it was not possible to simulate a real auction. For this reason, I tested the phenomenon by using *Qualtrics*, that even if it is a good investigation program, maybe it was not the most suitable simulation tool for the replication of online auctions. The aim of the current research was to study, in some way, a bias, an irrational behaviour, and most of the differences in a not-conscious behaviour cannot be fully captured with the questionnaire. Furthermore, with this questionnaire was possible to submit just one bid and two potential following bids. In the reality there are no limits on the number of bids and looking at the results it is possible to suppose that in the case of High Time Pressure and Small Increment bidders' could continue bidding and eventually resulting in overbidding. Fourth, the respondent was questioned only on one item: an eight Gigabyte USB pen drive. The choice to investigate this selected item was due to its relatively low price (around 10

Euros) and the large spread all over the population with different ages. The combined test on different products would be more reliable since it could study different market segments and it could capture the real interest in the item sold.

Fifth, the sample was selected through the use of social networks and by asking to the LUISS students, after it was asked to respondent to share this questionnaire with their network. Even though I tried to submit the questionnaire to a variegated sample, however the final result shows that the studied sample was not very representative of the whole population. The majority of the sample were students that even if they may be Internet users and on-line auction shoppers, they do not comprise a demographically diverse group. In addition, the method itself, the questionnaire, was not the most effective to be sure that respondent would be involved. A simulation of a real auction, with a real item sold and real money to pay (or to win) would be first, more reliable on the irrational behaviours, then, more captivating and finally the participants would have an incentive to pay more attention to the questions, and this would have produced better results, in terms of their validity.

Finally, are we really sure that the factors mentioned, in chapter 2, that influence the bid decision process, could be studied separately? I believe that they act and interact in every second of the auction and their one-by-one study give to the experimenter just an idea, not an overview of overall phenomenon. These insights will be recalled in the following section on the tips for future research.

5.4 Future research

Since the present study was restricted to the time pressure and denomination effect test, the researcher could not get an overall overview of the variables that influence overbidding. It is clear that studying a lot of variable could be extremely hard, however future researchers should try to remove all the possibility of new variables that could influence the bid decision process.

Future research may expand this study in several ways. First, following studies could enlarge the validity of the hypotheses of the current work by examining other product categories. For example, this work selected a competitive item, 8Gb pen drive, but maybe it was not the best item to test, due to its spread all over the population or its questionable importance, I would propose that before each test, to each participant would be asked their interest in buying several items and their willingness to pay for that, in order to understand which is the most wanted item and return a highly valuable response.

Second, although I have made every effort to design the questionnaire as much as possible as an online auction, maybe the laboratory study could be the best solution to investigate irrational behaviour in order to minimize the disadvantages associated with self-report data. I would suggest an experiment of a simulation of a real auction in which participants have a budget to use in the auction to really win an item and if they bid over this budget they can pay with their money. It would involve more the participants and it would come the participants' feeling out, reflecting the online auction process.

Third, one limitation of this research was the homogeneity of the sample; trying to variegate the sample could give to researchers a better understand of the phenomenon by differentiating between ages and education levels.

Fourth, it would be interesting to explore the phenomenon of overbidding in auctions that give also customers the "buy it now" option. Despite the anomaly of such an action, in the case of eBay.com auctions it happens so frequently that it cannot be ignore. In fact, occasionally happened that the bidder pays a final price that exceeds the face value.

Fifth, was designed on the eBay.com model, maybe this pattern is not the best, although it reflects one of the most popular internet auction website. Future researches should test different auction types and show the relations between variables and auction models.

Sixth, the current study investigates only the Italian region, future works could focus on the differences between countries or do a more global work, letting the participants be from all over the world.

Finally, I want to stress the point that several studies showed that bidders' experience, endowment effect, social competition, time pressure, emotion anticipation, social facilitation and escalation of commitment directly influence the propensity to bid in an auction, eventually result in overbidding and I argue that these factors should be analysed simultaneously to understand how they influence the bid decision process in online auctions. One direction could be to examine neurological and physiological changes that occur when consumers behave in an excited game that could be the auction contest.

5.5 Conclusion

In recent years, online auctions have become popular and successful platforms for conducting business transactions. As they are platform that erase spatial and temporal, and geographic constraints, they have benefited both sellers and buyers by increasing the pool of potential bidders, decreasing the transaction costs of an auction, and matching demand and supply at the best price at one particular point in time. Moreover as the pool of potential bidder is potentially the entire world, the level of competition could be very high. The current experiment has explored whether and how Time Pressure and Denomination Effect influence the consumers' bidding decision process, by increasing the bids. In this work was stressed one typology of online auctions, really similar to eBay's one: ascendingbid auction, with hard close rules. The first main finding is the correlation between the two tested variables. Although this is a preliminary experiment the evidences of correlation are quite strong. This study demonstrates that consumers' perception of limited time to bid and the small increment influences the bid decisions process. In fact, timing affects significantly bidders' valuation of the item, that is more pronounced in the small increment scenario. Both factors have an effect on the willingness to offer and the amount to offer. In particular, the test showed that in the situation of small increment people submitted highest bids both in the "recommended" bid and in the "free" one compared to the high increment scenarios. Moreover, in the Small Increment case, there is significant interaction between small increment and time pressure; as the time pressure increases the willingness to pay grows. This result can partially explain the overbidding phenomenon; due to the perception of the limited time respondent were more willing to offer and willing to bid higher amounts of money, eventually resulting in overbidding.

Despite the several limitation of this work I believe that this research can inspire future investigations on this field. Further analysis may become very useful for marketers in the way of capturing the attention and interest of consumers in taking part in online auctions, giving them an online shopping experience that leads them to bid and to increase revenues from the managerial point of view.

In conclusion, this work is the first field study on consumers' behaviours in online auctions related to the small increment. It demonstrates the real impact of the Denomination Effect in online auctions as well as the Time Pressure. When these variables are combined there is

a significant evidence of their interaction. Thus, an appropriate action needs to be taken in terms of generalizing the results across different types of variables (i.e. factual data and emotional response) since in this study, only two of those have been examined.

I trust that this research can open a wide range of further researches on the topic by investigating the conscious and unconscious influence of different factors on consumer behaviours, including the Denomination Effect.

Appendix

The cases of Low time pressure (LTP) and Small Increment (SI) are underlined.

Immagina di aver bisogno di una nuova penna USB da utilizzare per poter conservare i tuoi file digitali. Hai bisogno di una penna USB che sia abbastanza capiente ma non necessariamente eccezionale e non hai in mente nessuna marca in particolare.

Inoltre, non avendo la possibilità di raggiungere il primo negozi di elettronica nella tua città decidi di cercare su Internet e sul sito di aste eBay.

Immagina di aver trovato su **eBay** un'asta con una penna USB da 8 Giga e che potrebbe fare al tuo caso.

L'asta termina tra circa 25 secondi (<u>6 minuti</u>) e l'ultima offerta è di **7 euro** (le spese di trasporto sono gratuite).

Noti anche che l'asta è popolata da **altri utenti** che potrebbero essere interessati allo stesso prodotto.

All'asta puoi fare una sola offerta.

Hai deciso di prendere parta all'asta e decidi di fare la tua offerta. Noti che per poter prendere parte puoi fare **il primo rilancio di minimo 2,00 euro <u>(20 centesimi).</u>**

Quanto saresti disposto a fare l'offerta per poterti aggiudicare la penna USB?

1	2	3	4	5	6	7
Per niente						Estremamente
disposto						disposto

Se avessi la possibilità di fare una seconda offerta incrementale rispetto alla precedente, quanto saresti disposto a rilanciare?

Niente	20cent	40 cent	80 cent	1,60€	2,50	3,50€
					€	

Indicaci, quella che secondo te sarebbe la quantità di denaro ideale per un secondo rilancio.

I rilanci possono essere anche in centesimi di euro considerando la base di partenza di 7,00 euro e la prima offerta già fatta.

Se avessi la possibilità di fare una terza offerta incrementale rispetto alle precedenti quanto saresti disposto a rilanciare?

					-	
Niente	20cent	40 cent	80 cent	1,60€	2,50	3,50€
					€	

Indicaci, quella che secondo te sarebbe la quantità di denaro ideale per un terzo rilancio.

I rilanci possono essere anche in centesimi di euro considerando la base di partenza di 7,00 euro e la seconda offerta già fatta.

Quale sarebbe, secondo te, il prezzo ideale è più corretto per potersi aggiudicare la penna USB da 8 Giga?

Indica il prezzo in euro.

Per cortesia, indichi i suoi dati

Genere:

- Uomo
- Donna

La sua età

La sua occupazione

• Disoccupato

- Studente
- Impiegato a tempo pieno
- Impiegato part time
- Casalinga
- Pensionato

Il suo livello d'istruzione

- Diploma di Scuola Media Inferiore
- Diploma di Scuola Media Superiore
- Laurea triennale
- Laurea Specialistica
- Dottorato di ricerca
- Altro

Il suo stato civile

- Single
- Vivo con un'altra persona/Sposato
- Separato/Divorziato
- Vedovo

Grazie per la sua partecipazione!

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Department of Management Chair of International Marketing

OVERBIDDING IN ONLINE AUCTIONS: HOW TIME PRESSURE AND DENOMINATION EFFECT INFLUENCE THE BID DECISION PROCESS

SUPERVISOR

Prof. Costabile Michele

CANDIDATE

Sanchietti Claudia

Student No. 666511

CO-SUPERVISOR

Prof. Marcati Alberto

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Introduction

Economic literature assumes that bidders think rationally and behave calmly. However, this is not always the case. A myriad of studies has been done regarding human behaviours. Since the first, in 1995, online auctions have become increasingly popular and researchers became more and more interested in understanding bidders' behaviours. The rational theory predicts that bidders would set a strategic limit an and they would never bid past their true reservation price for an item. However, some studies show that people participating in online auctions perceived them more as a game rather than a purchase. In this game they feel competition and pressure resulting in a propensity to bid more than their willingness to pay.

Several researches show the irrational behaviour of bidders in online auction. Irrational behaviour in this field can be explained in the way that due to emotions and excitement, people are willing to pay more than what they think "fair" price is. The action of bidding more than is own willingness to pay is known as overbidding.

A clear example is reported in the Matthew T. Jones (2011) research: in 41.1% of 506 auctions they studied, the winning price exceeded the face value, which is an upper bound for rational bidding. Reasons of this misbehaviour are infinite. On one hand, researchers found "physical" variables that influences it, like the auction design, web-site design, colours or images. On the other hand, endowment effect, auction fever, time pressure, social competition, escalation of commitment, rivalry and experience are recognized as main factors influencing bidders' behaviours. All this circumstances change the perception of the item sold at the auction, and modify feelings and emotions of bidders.

The aim of this research is to provide evidences of irrational behaviour in online auctions. Specifically, I am going to investigate whether there is a correlation between the Time Pressure and Denomination effect that influence the bidding behaviour online auctions. These variables will be examined separately and together to understand better their effect on overbidding behaviour. The purpose of this study is to provide a systematic examination of how time pressure and small increments influence both the propensity to overbid and the magnitude of overbidding, which no previous studies have simultaneously considered. Moreover, time pressure has always been studied though the auction fever phenomenon, with the exception of El-Haji et al. (2016)'s paper, in which they declared they are the first

that manipulates time pressure exogenously to investigate its impact on bidding behaviour. Since no previous researcher identified the Denomination Effect as a potential variable for affecting bidding behaviour, neither alone nor with other potential factors this work enlarges the literature by giving the evidence of the impact of this variable in the bidding behaviour in online auction.

Extant Literature

Live and online auctions: An auction is a market institution with an explicit set of rules determining resource allocation and prices on the basis of bids from the market participants³⁵. Online auctions differ from live auctions for several aspects; in live auction the physical presence is required, the number of bidders is limited as also the number of the items sold. In live auction an auctioneer proposes an offer and bidders can accept or not, in an online auction bidders submit their valuation for the item. Online and traditional auctions can be divided in four main categories however the particular typology used in this work is the *English auctions* (or ascending-bid auctions) in which bids are done interactively in real time(i.e. dynamic auction), the price is raised by bidders until finally only one bidder remains. The essential feature is that at any point in time each bidder knows the level of the current best bid. Online auctions are platforms that erase spatial and temporal, and geographic constraints, and match demand and supply at the best price at one particular point in time. Unique features of online auction are the availability of information about the buyer such as reputation, or number of items sold and about the product (pictures and prices of similar items on other online stores etc.). In online auction we can define two ending rules: fixed deadline or not fixed deadline. If the deadline is fixed (in eBay for example) the potential buyer can see at any time the deadline, that is a specified hour at a specific day. If the deadline is not fixed (such as in Amazon.com) the auction ends only when a pre-specified number of minutes have passed without a bid. The different ending rules paved the way to study the bidding behaviour and the most appropriate strategies.

Overbidding: The winning bid is often based on an overestimation of the item's true value. When in an auction only one bidder left means that nobody else valuate the item more

³⁵ McAfee R.P. and McMillan J. (1987).

than the highest bid, so the highest bid does not correspond with the market value of the item. This circumstance is known as overbidding. Even if there are two schools in defining overbid phenomenon here the useful definition for this work is given. Overbidding happens when placed bids exceed the face value of the item.

Variables that influence overbidding: the variables can be split in two different groups, labelled factual data and emotional responses. In the factual data category are contained unbiased reasons, while the emotional responses are a response of playing the auction game, influence the bidders' emotional state. In the following figure they are displayed into categories.



Figure 1: Overbidding variables

To the emotional response category also belong one of the central variables of this work;

Time Pressure. Literature gives a suitable definition: "time pressure is the perceived need or desire to make judgments or decisions quickly"³⁶. Researchers found evidences on its influence on judgments and choices and that it leads people to rely more on heuristics and to fall prey to cognitive biases that would be reflected in changes in behaviours due to the perceived limitation of the time available to make a decision and under time pressure people is more willing to take risks. To better understand how time pressure works in the

³⁶ Carnevale, P. J. D. and E. J. Lawler. (1987).

online auction contest, it is essential to differentiate between the types of auction. In ascending-bid auctions with a hard end, so the deadline is fixed, time pressure can influence the bidding process by let the bidders experience the pressure of the ending time.

- Denomination Effect: is the second main variable analysed in this work. Raghubir and Srivastava (2009) gave the following definition to describe it: "the denomination effect is a theoretical form of cognitive bias relating to currency, whereby people are less likely to spend larger bills than their equivalent value in smaller bills". Literature demonstrated that the likelihood of spending is lower when money is represented by a single large denomination (one \$20 bill) relative to when it is represented by many smaller denominations (20 \$1 bills), holding total amount constant, for actual purchase decisions rather than spending intentions. The idea of linking denomination effect and auctions is motivated by the design of the online auctions. Most of the auction websites give the possibility to the potential bidder to select the bid it recommends, without thinking in the real value of the item. The recommended bid is a small increment on the previous bid (\$0,50 -\$1). The aim of the current work is to highlight the importance of this suggested small increments in the overbidding behaviour.
- *Competitive arousal*: Arousal itself has been shown to have systematic effects on decision making: it can hinder effective decision making by restricting the capacity of the think. Auctions have the potential to provide an exciting shopping experience, that is, to evoke emotions and high levels of arousal throughout the auction process. The competitive arousal model suggests that rivalry, social facilitation, and time pressure as well as the uniqueness of being first, can fuel bidders' arousal, impair their decision-making, and push them to bid past their limits. This model predicts predicting that bidders will be more likely to exceed their reservation prices when few rather than many other bidders remain (rivalry), particularly at the end of an auction (time pressure). Often literature identifies arousal as a component of auction fever phenomenon.
- *Auction fever* is viewed as bidding over one's pre-selected limit and is often accompanied by increased arousal. Ku et al. (2005) define auction fever using overbidding as a key element; "Auction fever is the emotionally charged and frantic behaviour of auction

participants that can result in overbidding". Auction fever is primarily emotional and people under auction fever's effect can act in an irrational way. Murnighan (2002), for example, noted that in the heat of the moment, "(the bidders') adrenaline starts to rush, their emotions block their ability to think clearly, and they end up bidding more than they ever envisioned". In the following figure it is displayed how variables could provoke the overbidding behaviour. The two main variables of this research have been categorized in factual data (Denomination Effect) and emotional response (Time Pressure).



Figure 2: How variables influence overbidding

Hypotheses of the dissertation

Time pressure and denomination effect are considered variables that push consumers to change their value-perception of the item during online auction, driving them to consider the object sold as more valuable compared to the previous valuation. The hypotheses are focused in an ascending-bid auction with a fixed ending. Literature showed that if the end is not fixed people do not experience time pressure as well as in descending auctions were bidders submit lower bids and definitely overbid cannot happened.

The definition of time pressure useful for this work is the following: time pressure, through the perception of the limited time available, influences judgments and choices by increasing physiological arousal that which in turn restricts the ability of consumers to make a rational decision and increases their willingness to take risks. Hence, bidders are highly aroused and unable to think clearly, and since decisions need to be made quickly, bidders keep bidding. Thus, my first research hypothesis states:

HP 1. Under the influence of higher time pressure levels, bidders place higher bids in ascending clock auctions with a hard close end, eventually resulting in overbidding.

The second factor studied in this research is denomination effect. There are no evidences in literature on whether, how and when the denomination effect (i.e. small increment) influences the bid decision process. Despite the absence of empirical data, the current research tries to fill this gap with experimental analyses. The idea of linking denomination effect to online auction came from the literature. Consumers are more willing to pay small bill several times rather that the entire amount once and Mishra et al. (2006). have demonstrated that people tend to spend more when using payment modes different from cash, such as a credit card or a gift certificate and in the majority of the cases it is possible to pay a won auction without cash. Moreover, in the moment of bidding in online auctions, consumers have just to click on one button, so psychologically they are not buying, because they are not bringing out their pickpocket or touching their money. When consumers buy online they do not think in the real value of the item; they have not the perception of spending money. This work tries to discover and highlight the importance of denomination effect in the overbidding behaviour. Therefore, the second hypothesis states:
HP 2: *The small increment, recommended by the auction website, pushes bidders to bid and continuing bidding, eventually resulting in overbidding.*

In the end we can combine the first two hypotheses. For the third one, there is the assumption that the bid decision process of buyers is influenced through (1) time pressure and (2) denomination effect. Each of these is important and has the potential to influence the final result, that is overbidding. Moreover, here I suppose that when both, time pressure and denomination effect are present and perceived by consumers, their combined effect is higher rather than when they stand-alone. With the third analysis I want to illustrate how big is the combined effect of time pressure and denomination effect (i.e. small increments) on the bidding behaviour. Hence, the third hypothesis of the current work is:

HP 3: Under the influence of higher time pressure levels and the small increment recommended by the auction website, bidders place higher bids in ascending clock auctions with a hard close end, eventually resulting in overbidding.

The experiment

The aim of this study was to investigate if time pressure and denomination effect affect the bid decision process, eventually resulting in overbidding. It was designed to be as much reliable as possible, trying to find an interesting item to sell. I tested an 8 Gb pen drive, as the auction item sold, and how respondents behave in an as realistic as possible online auction. The experiments were conducted by using Qualtrics, an online data collection platform. It had the questionnaire form that was filled online. It was divided in three main parts: instructions, auction simulation and personal information. Questions were of different typologies: 7-point Likert rating scale, multiple choices and open questions. The experiment was design as a 2x2 matrix in which the variables were time pressure (High, Low) and increment (High, Small). The platform selected randomly one of the four scenarios and submit it to the respondent. In the High Time Pressure (HTP), people were participating in an auction and the end of this auction was in 25 seconds, instead in the Low Time Pressure (LTP) the auction would end in 6 minutes. In the case High Increment (HI) was selected by the online platform, participant faced the minimum possible bid of 2 Euro,

whereas in the case of Small Increment (SI) the minimum bid was of 0,20 Euros. In Table 1 is possible to see the four scenarios.

	High Time pressure (HTP)	Low Time pressure (LTP)			
Small Increment	Auction ends in 25 seconds/	Auction ends in 6 minutes/			
(SI)	minimum bid of 0,20 Euros.	minimum bid of 0,20 Euros.			
High Increment	Auction ends in 25 seconds/	Auction ends in 6 minutes/			
(HI)	minimum bid of 2,00 Euros	minimum bid of 2,00 Euros			

Table 1: Experiment scenarios

Sample: Participants were invited to fill the questionnaire by social networks or they were asked in the LUISS University. Under any circumstances respondent knew of the questionnaire topic and participants were not informed about the existence of the other treatments. In total, 124 individuals accepted the invitation to answer to the survey, that was run in November 2016. The percentage of males was 50,8 % (N=63) while females were 49,2% (N=61). The distribution of participants across the four treatments and the percentage of male and female in each scenario is shown in figure 3.



Figure 3: Sex of the sample

Participants were from 18 up to 33 years old, the average age was 22,54 years and a standard deviation of 2,82. Education and occupation reflect the average age. Almost 90%

of the respondents have high school and bachelor's degree. Students were 77,42% of the and 15 % were employed.

In the essential part of the questionnaire was asked to respondent their willingness to offer to win the Pen Drive. They had to choose a value between 1= not interests in offer and 7= extremely interested in offer. The results differ from each scenario; in figure 4 it is possible to see in a line the position of each scenario. Considering 4 the average of the 7- point Liker scale as respondent indifference in offer, we can notice that in the scenario LTP+HI the possibility to offer is less attractive (average of 3,12) than the HTP+SI scenario in which the average is 5,88. The intermediate points are very close to the indifferent one (4); HTP+HI with an average valuation of 3,66 and the LTP+SI scenario with an average of 4,11.



Created by the Author

Figure 4:7-points Likert scale on the willingness to offer

Several tests have been done; Levene test, test Between-Subjects Effects, paired comparison analysis, univariate analysis.

The main result is the evidence against the null hypothesis that there are no differences between High and Low time pressure, but only in the case of small increment, (with a p-value=0) means that it is true in 99,99% of the cases. While in the high increment case, the p-value is so high (=0,227) that means there is no correlation between the variables. These results can be observed in figure 5.



Figure 5: Figure 5: Expected Marginal Averages

After the study of the dependent variable, was asked to respondents the ultimate price to win the 8 Gigabyte pen drive auction. The average ideal price was 9,66 Euros, with some differences between the different scenarios. In figure 6, they are displayed in a monetary-line. The highest valuation is given by the respondent of the High Time Pressure+ Small Increment (HTP+SI) scenario while the lowest by the High Time Pressure+ High Increment (HTP+HI) scenario.



Figure 6: Average ultimate price

Then, there were other questions about an hypothetical second and third raise. It is necessary to underline that before this question, participant had bid their first time; in the case of small increment they bid 0,20 Euros while in the high increment treatments they bid

2 Euros. To each group was asked to submit one of the recommended bid, starting from zero up to 3,50 Euros, and then to specify the exact amount that there are interested in offer. It is important to underline that in the cases of the High Increment, the averages of both recommended and ideal bid are significantly below the small increment treatments. At the same time is vital to accentuate the fact that in the case of High Time Pressure+ Small Increment (HTP+SI) the ideal bid is two times the recommended bid both in the second and third raise, in which it reaches 1,98 Euros. This preliminary study of the hypothetical raises is useful to understand if the overbidding phenomenon occurs.

In Table 2, the cumulative price that on average each group reached is shown. The results of whether overbid happened are displayed in the last column. There is just one case in which there is no overbidding; Low Time Pressure + Small Increment. We can notice that the case in which the magnitudo (i.e. the difference between the average ideal price and the final price resulting by the sum of all the bids) is higher and equal to 0,96 Euros.

	Α	В	C	D	Ε		
	Auction	Increment	A + B +	C +	Average	Overbid/	D - E
	Starting	Small/ High)	Average	Average	of ideal	No	Magnitudo
	point		of ideal	of ideal	price by	Overbid	of
			second	Third	groups		overbidding
			bid	bid			
LTP/HI	7,00	2,00	9,71	10,06	9,56	Overbid	0,50
HTP/HI	7,00	2,00	9,79	10,23	9,27	Overbid	0,96
LTP/SI	7,00	0,20	8,29	8,90	9,77	No	
						Overbid	
HTP/SI	7,00	0,20	8,87	10,85	10,03	Overbid	0,82

 Table 2:Overbidding and Magnitudo of Overbidding

(The number are prices in Euros)

Results and assessment

Consistently with existing literature the experiment provided the result that time influences the decision process in the online auctions contest. However this was not the primary object of this research. The experiment that I have made includes a variable that, for my knowledge, no one else investigated before in the online auctions contest; increments. In particular two of the hypotheses of this thesis was that the small increment influences the bids in auction and that the interaction between a perceived High Time Pressure combined with Small Increment results in a higher effect. Surely, it is possible to underline that the interaction of time and increment is significant since when one variable increases at the same time the other variable grows. Moreover, the different analysis showed that the interaction of the two variables is valuable but only in the case of the small increment.

In conclusion, I am neither completely satisfied nor completely unsatisfied by these results. With the current results it is possible to affirm that there is a significant interaction between time pressure and small increments, however the case of combined High Time Pressure and Small increment is not the only case in which bidders experience overbidding, neither the case in which the overbidding phenomenon is more pronounced. The current research has some limitations that could be improved to get an overall understanding of the overbidding phenomenon.

Conclusion

In recent years, online auctions have become popular and successful platforms for conducting transactions. As they are platform that erase spatial and temporal, and geographic constraints, they have benefited both sellers and buyers by increasing the pool of potential bidders, decreasing the transaction costs of an auction, and matching demand and supply at the best price at one particular point in time.

The current experiment has explored whether and how Time Pressure and Denomination Effect influence the consumers' bidding decision process, by increasing the bids. In this work studied one typology of online auctions: ascending-bid auction, with hard close rules. The first main finding is the correlation between the two tested variables. Although this is a preliminary experiment the evidences of correlation are quite strong. This study demonstrates that consumers' perception of limited time to bid and the small increment influences the bid decisions process. In fact, timing affects significantly bidders' valuation of the item, that is more pronounced in the small increment scenario. Both factors have an effect on the willingness to offer and the amount to offer. In particular, the test showed that in the situation of small increment people submitted highest bids both in the "recommended" bid and in the "free" one compared to the high increment scenarios. This result can partially explain the overbidding phenomenon; due to the perception of the limited time respondent were more willing to offer and willing to bid higher amounts of money, eventually resulting in overbidding.

This work has several limitation such as: the heterogeneous sample, the questionnaire method instead of a real auction simulation and the test of only one item. Further researches should improve these limitation in order to give other useful suggestions for marketers in the way of capturing the attention and interest of consumers in taking part in online auctions, giving them an online shopping experience that leads them to bid and to increase revenues from the managerial point of view.

In conclusion, this work is the first field study on consumers' behaviours in online auctions related to the small increment. It demonstrates the real impact of the Denomination Effect in online auctions as well as the Time Pressure. When these variables are combined there is a significant evidence of their interaction. Thus, appropriate actions need to be taken in terms of generalizing the results across different types of variables (i.e. factual data and emotional response) since in this study, only two of those have been examined.

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