The Effects of Induced Mood on Preference Reversals and Bidding Behavior in Experimental Auctions

Drichoutis, Andreas and Nayga, Rodolfo and Klonaris, Stathis

University of Ioannina, Agricultural University of Athens

October 2010

The effects of induced mood on preference reversals and bidding behavior in experimental auctions

Andreas C. Drichoutis[1], Rodolfo M. Nayga, Jr.[2] and Stathis Klonaris[3]

[1] Dept. of Economics, University of Ioannina, Greece (email: adrihout@cc.uoi.gr, tel: +30-26510-05954)

[2] Dept. of Agricultural Economics & Agribusiness, University of Arkansas, USA

[3] Dept. of Agricultural Economics, Agricultural University of Athens, Greece

Acknowledgments

We would like to thank Spyros Stachtiaris and Achilleas Vassilopoulos for excellent research assistance and Jayson Lusk for helpful comments. Drichoutis and Klonaris acknowledge financial support from the Secretariat of Research Committee of the Agricultural University of Athens.

Abstract

This article contributes to the research agenda of accommodating psychological insights in conventional lab experiments. We specifically test whether inducing subjects into different mood states has a significant effect on subjects' rationality (in the form of preference reversals) and on bidding behavior in homegrown value auctions. We find that mood states can significantly affect the rate of preference reversal and bidding behavior in experimental auction valuation. Specifically we find that subjects exhibit more rational behavior under a positive mood state than under a negative mood state. Subjects in a positive mood provide lower bid values than others. Regardless of mood states, males tend to have a higher rate of preference reversal than females in mixed gender sessions. However, females tend to commit a higher rate of preference reversal in female only sessions than in mixed sessions while males tend to commit a lower rate of preference reversal when in male only sessions than in mixed sessions.

Keywords: mood, affect, rationality, Vickrey auction, preference reversals, gender differences

JEL codes: C91

The "Paretian Turn" that took place in the early 20th century, initiated by Pareto, stripped economics of all psychological concepts by basing economic theory on the principles of rational choice (see Bruni and Sugden 2007 for a historical perspective). However, with the advent of "behavioral economics", economics and psychology no longer stand in complete isolation. In fact, a number of papers that interacted economics with psychological concepts have appeared in core economic journals (1998; Elster 1998; Rabin 2002). For example, Elster (1998) brought out the interesting features of "emotions" that could be useful in developing economic theory and in explaining human behavior. Elster's work has been extremely influential as evident by the increased number of published articles following his work. His article has also been cited by a number of economists who studied the effect of emotions on economic behavior. For example, Bosman et al. (2005) and Reuben and van Winden (2008) explored the effect of emotions such as anger, irritation, envy, happiness, joy etc. in a "power-to-take" experiment (Bosman and van Winden 2002) while Grund and Sliwka (2005) examined the effect of envy and compassion in a tournament competition while Karni et al. (2008) tested for the presence of concern for fairness in individual choice behavior in a three person dictator game.

Although a number of economic studies have focused on studying the effect of emotions in recent years, there is scant literature on the examination of the closely related concept of mood in economics. The literature in economics usually confounds emotions and mood in an almost indistinguishable way. However, there are stark differences between emotions and moods, as described in the psychology literature. Emotions tend to be extremely brief, lasting for a few seconds (Izard 1991; Larsen 2000) while moods typically last longer (Watson and Vaidya 2003). Prolonged emotional states are possible but they only tend to be dysfunctional manifestations of psychopathology (Clark and Watson 1994). Watson and Vaidya (2003) provide an example of how the full emotion of anger might last for only a few seconds while an annoyed or irritable mood may persist for several hours or even for a few days. In essence, the concept of mood subsumes all subjective feeling states, not simply those experiences that accompany classical, prototypical emotions such as fear and anger (Watson and Vaidya 2003). Therefore, to explore all aspects of affective states on human behavior, it would be necessary to go beyond the narrow boundaries of emotions by examining the much broader concept of mood.

Moods states could influence behavior by influencing both the content and the process of cognition (Capra 2004). Moods can also play an important role in the construction of preferences that in turn influence decision-making and judgment (Payne, Bettman, and Schkade 1999; Slovic 1995; Lichtenstein and Slovic 2006; Johnson, Steffel, and Goldstein 2005). Hence, given that some cognitive process is employed in people's choices, it would hardly be a surprise if mood states are able to affect human decision making and behavior. In fact, in two studies that used simple games, mood states have been found to influence generosity and reciprocity (Kirchsteiger et al., 2006) as well as altruism (Capra, 2004).

In this study, our goal is to examine how mood states can affect people's behavior in a conventional laboratory experiment (see Harrison and List 2004). Specifically, we explore how positive and negative mood states affect the rate of preference reversals and bidding behavior in experimental auctions. We focus on experimental auctions since there has been increasing interest in using these homegrown value auctions for price discovery purposes (i.e., measuring people's willingness to pay for products and/or product attributes). These types of auctions are considered incentive compatible because they provide subjects an incentive to reveal their true valuation for the products being auctioned. However, this incentive compatibility property could be undermined if mood effects are significant and not taken into account. If mood states can significantly influence behavior in laboratory economic experiments such as ours, then this can have significant implications for experimental designs and the need to control for mood states when conducting laboratory auction experiments. To our knowledge, our study is only the third paper in economics that assessed the effect of moods in a complex environment such as auctions. The other two studies are by Lerner et al. (2004) which found that a negative mood state in the form of sadness (disgust) can increase (decrease) willingness to pay (WTP) and by Capra et al. (Capra, Meer, and Lanier 2006) which found only weak mood effects on WTP. One of our aims in this paper is to test the robustness of the findings of these two papers. Our paper however differs from these two studies in that we focus not only on the effect of mood states on WTP but also on people's rationality as represented by rate of preference reversal. No other known study has examined the effect of mood states on rate of preference reversal in experimental auctions.

The preference reversal phenomenon is an important issue to examine since it reflects on how people behave "rationally". It is considered an empirical regularity that was first noticed by psychologists (Slovic and Lichtenstein 1968). While economists such as Grether and Plott (1979) first set out to disprove the psychologists' work on the preference reversal phenomenon, they ended up attesting to its robustness. Since then many studies have tried to explain the causes of preference reversals and these are nicely summarized in Seidl's review (Seidl 2002). Despite the numerous studies, the issue was not of course settled. Economists found new patterns of preference reversals that were incompatible with the best-known explanations (Cubitt, Munro, and Starmer 2004) or even presented new theories, such as the third generation prospect theory, that could predict observed patterns of the preference reversal phenomenon (Schmidt, Starmer, and Sugden 2008). Harrison et al. (2007) argued that preference reversals often happen because the cost of an error is really small when people are risk averse. However, at its very basic design (e.g., Cox and Grether 1996), the rate of preference reversals can be seen as a test of preference theory. Our basic question is therefore whether certain mood states can alleviate the rate of preference reversal or make it worse. To generate preference reversals in our experiments, we asked our subjects, among others, to price lotteries in an auction setting. Since lotteries are homegrown value goods, our design also allows us to examine the effect of induced mood states on bidding behavior.

Additionally, we explore in this study if there are significant differences in mood effects by gender on both WTP and rate of preference reversal in experimental auctions. While it is well known that there could be significant gender effects in competitive environments (Gneezy and Rustichini

2004; Gneezy, Niederle, and Rustichini 2003; Niederle and Vesterlund 2007) such as experimental auctions, no other known study has evaluated whether these gender effects vary across different mood states. Results of our study could have significant implications not just for experimental auction design and modeling but also for decision making in general.

This paper proceeds as follows: the next section presents a literature review of published studies that deal with mood in the economic literature. The purpose of the review is to set the context of our study and place it in the existing literature. Section 3 describes the experimental design set forth and section 4 describes the analysis and the results. We discuss the general findings and then conclude in the final section.

Literature review

A systematic review in EconLit of published articles that include mood in the title of the paper, identified less than 50 papers. These include papers published in journals of broader economic areas that often move along the boundaries of psychology and economics as well as in the fields of marketing, business and finance. These articles have been scattered around many, often diverse, journals. The big core of mood related articles (more than half of the papers) have been published in marketing type journals like *The Journal of Consumer Research*, *Journal of Marketing Research* or *Psychology & Marketing*, spanning a period from 1985 to 2011. On average, about one paper is published per year in the marketing field.

In this section, we will primarily focus on studies that are related to consumers' decision making processes and only briefly mention studies related to other topics. For example, there is a small literature developed in the field of finance that examines the relationship between equity pricing and mood (e.g., Dowling and Lucey 2008a; Saunders 1993). However, these and other studies (e.g., Kamstra, Kramer, and Levi 2000; Dowling and Lucey 2008b; Kliger and Levy 2003) do not deal with individual decision making but rather try to relate exogenous phenomena like weather and lunar phases (that are assumed to affect collective or social moods) with investors' behavior.

As mentioned previously, a majority of the mood related literature is published in the field of marketing. One of the characteristics of these papers published in marketing journals is that they spend considerable effort in inducing individuals into certain mood states and then studying the effect of inducement on specific market like phenomena. Although dated, a good literature review which focuses on consumers' mood related behavior is by Gardner (1985). Gardner examined the effect of induced moods on a range of behaviors, affective reactions, judgments and ability to recall information. A considerable amount of this review suggested that mood has a direct and indirect effect on behavior, product evaluation and recall.

Since Gardner's literature review, the marketing literature has been very active publishing empirical studies that examine the effect of induced mood states on a variety of phenomena. A widely cited finding is that happy mood induces people to provide higher product evaluations, an effect which persists even days after the original evaluation (e.g., Pocheptsova and Novemsky 2010; Sar, Duff, and Anghelcev 2011). For example, in Lawson (1985), happy mood-induced subjects gave higher product desirability ratings than subjects in sad mood. Perhaps this is due to the fact that positive mood biases negative thoughts, which in another study led to more favorable evaluation of advertising messages (Batra and Stayman 1990). Indeed, Lawson (1985) found that people in negative mood tend to recall more negative information while Batra and Stayman (1990) found that positive mood leads to more heuristic processing of information i.e., affect the amount of total cognitive elaboration, bias the evaluation of argument quality, and peripherally affect brand attitudes.

In addition, Swinyard (1993) found that only *involved* subjects (i.e., in a shopping experience) in a positive mood evaluated a shopping experience favorably. When people think that the evaluation they are doing is important, then they are more likely to rate a product favorably but not when it is not perceived as important (Curren and Harich 1994). A similar effect on product ratings was observed in Raghunathan and Irwin (2001) but the effect of mood on product ratings was greater under domain mismatch (i.e., whether products in the context set belong to the same category as the target) than under domain match. Qiu and Yeung (2008) reconfirmed that subjects in a happy mood rate products more favorably than subjects in an unhappy mood. They also showed that mood influences comparative judgments. Specifically, they found that participants in a happy mood tend to choose the first shown option (from a list of three bakery products). However, when information about the flavor of the products was released right after all products were shown, subjects tend to choose the last shown option and evaluated this option much higher. Similar effects to product evaluations have been documented with service quality ratings (see for example Sirakaya, Petrick, and Choi 2004; White 2006; Barger and Grandey 2006; Knowles, Grove, and Burroughs 1993; de Ruyter and Bloemer 1998; Pugh 2001).

A small strand of the marketing literature has also reported on how mood relates with brand extensions, brand evaluations/selections and brand recalls. Barone et al. (2000) found that positive mood not only affects evaluations of the product under examination but also of the product's brand extensions since it makes brand extensions to be perceived similarly to core brands. Consumers are also more likely to learn more brand names, recall brands from more categories, recall more brands per category and exhibit more clustering of brands from the same category under a positive mood (Lee and Sternthal 1999). This effect of positive mood on brand recall was demonstrated even when mood was induced 72 hours later than when ads were displayed (Knowles, Grove, and Burroughs 1993). Moods have also been found to affect brand choice since positive mood prompts experiential selection strategies (i.e., concentrating on feelings and fantasies about using particular brands) whereas negative mood prompts informational strategies (i.e., using acquired or stored brand information) (Gardner and Hill 1988). In addition, subjects in positive mood are more reluctant to switch brands and lose confidence in their preferred brand when disconfirming information (i.e., information challenging subjects tentative preferences) are given, which can be interpreted as a sign of less preference reversals (Meloy 2000).

In addition to mood effects on product and brand evaluations, moods have also been shown to affect the very core of the decision making process. For example, in Spies et al. (1997), subjects in a positive mood were found to be more satisfied with their shopping experience and to spend more money on spontaneous purchases. Positive mood has also been demonstrated to affect decision making by facilitating resistance to temptation (as defined by choices between two snack items; M&Ms and grapes) (Fedorikhin and Patrick 2010). Atalay and Meloy (2011) also showed that bad moods can affect decision making, i.e., it can lead to greater purchase and consumption of unplanned treats for the oneself.

The decision making process for subjects in a positive mood may also be related to higher needs in Maslow's hierarchy, involvement of more sensory and experiential thoughts (Gardner and Hill 1989) and more variety seeking (but not in extreme positive mood) (Roehm and Roehm 2005). Mood has also been shown to affect risk taking behavior. Park et al. (2005) found that positive mood negatively influenced perceived risk from online purchases which in turn positively influenced purchase intention. Similarly, Grable and Roszkowski (2008) found that positive mood was associated with having a higher level of financial risk tolerance, as measured by a series of hypothetical questions.

Two more studies found significant differences on how subjects' decision making is affected by mood in the judgmental and risk domain. Englich and Soder (2009) asked subjects to take upon the role of a judge and decide how to punish a person in a shoplifting scenario. The scenario was anchored with either a low or high sentence from the prosecutor. The expert sub-sample anchored their decision independent of the mood state they were into, while the non-expert sub-sample under a positive induced mood remained uninfluenced by the given anchor. Results remained uninfluenced even when the authors changed the judgmental domain to be less affective in nature. In another study, de Vries et al. (2008) tested how mood affects subjects that play the Iowa Gambling task. In this game, subjects were given two decks of cards to choose from. Profits were determined based on draws from the decks. Subjects had to learn through repetition that only one of the decks increases their profits. The authors found that subjects in a positive mood relied more on their gut-feelings in decision making (better performance in the early stages of the game when subjects are still highly uncertain) while those under a negative mood adopted a more careful, analytical decision strategy. Similar findings in de Vries et al.(2010) show that positive mood is associated to a lesser extent with a rule-based strategy that maximizes expected outcomes (i.e., logical rules) than negative mood.

In contrast to the more established and expansive literature from other fields of social science, the literature on mood effects in economics is more limited and recent. Examples of these recent economic papers include Capra (2004) who studied the effect of induced mood states in a standard trio of games that are often used in experimental economics i.e., the dictator, ultimatum and trust games. She found that positive mood in the dictator game induces helping behavior i.e., proposers contributed more to the receiver. In the ultimatum and trust games, choices of those with positive mood were closer to rational choices and farther from the benchmark than those with negative mood. Her findings were generally confirmed by Kirchsteiger et al. (2006). They found that subjects playing a gift-exchange game were more generous to others although they had much lower reciprocal behavior. More recently, Capra et al. (2010) studied the effect of induced mood on *induced* and *homegrown* value nth price auctions. They found that positive mood made the auction less demand revealing in nature i.e., subjects overbid more relative to their *induced* value. However, their results generally suggest that mood only had a weak effect on *homegrown* value elicitation. Although published in a marketing journal, Meloy et al. (2006) is closely related to economic science since they examined how experimental economists embraced financial incentives as an essential element to the validity of their research. The authors randomly assigned subjects to (financial) incentive and no-incentive treatments and found that financial incentives altered subjects' mood but this resulted in decreased task performance since elevated mood negatively influenced information processing in decision making.

In summary, we have demonstrated that much of the literature on mood effects has been published in non-economic social science literature. Our objective in this study is to add to the scant economic literature on mood effects by focusing on the effect of induced moods on the observed anomalies in preference theory and in homegrown value auction experiments. Our study is different from Capra et al. (2010) in that: (1) we focus on subjects' rationality or rate of preference reversals and (2) we explore gender differences in mood effects on both WTP and rate of preference reversal. While there are differences in experimental designs, we can also use our study to test the robustness of their findings. Conducting the experiments with homegrown auction experiments is also important since the number of these experiments conducted by economists has grown significantly in the last 10 years partly due to increasing interest in experimental auction methodologies and valuation research.

The experiment

To explore the effect of mood on human decision making we designed an experiment with a three-fold purpose. Our first objective was to explore the rate of preference reversals in the market for lotteries. Lotteries are homegrown value goods, but assuming rationality, individuals' rankings of two lotteries should be the same whether they are participating in a choice task or submitting separate bids for the two lotteries in an experimental auction. A comparison of the frequency of preference reversals across treatments where we induce different mood states would allow us to determine whether positive or negative mood leads to increased/decreased rationality. Our second objective is to explore the effect of induced mood states on bidding behavior in homegrown value auctions, which will enable us to examine the robustness of the results obtained in Capra et al. (2010). In their study, they obtained only weak mood effects on subjects' WTP.

Since the tasks that our subjects undertake involve choices under risk in what might look like a competitive environment and given the widespread evidence on how males and females behave differently under those conditions (e.g., Niederle and Vesterlund 2007; Gneezy, Leonard, and List 2009; 2009b, 2009a), our third objective was to isolate any gender effects that might come up in mixed sessions and explore how subjects behave when only peers of the same gender participate in the lab. Therefore, we run additional sessions with males only and females only.

To minimize the number of sessions that we would need to run the full design, we decided to induce different mood states to subjects in the same session. Given that our computer lab is equipped with private booths and no communication was aloud, we were certain that no mood contagion would take place. Our mood inducement technique is described in detail below.

The mood experiment was part of a larger project on choice under risk, therefore it also involved some risk preference and time preference tasks. The time preference task was placed at the very end of each session since it involved winning a considerable amount of money and we did not want to risk contaminating the previous tasks with income effects. The risk preference task and the preference reversal task (which include the auction) were presented in alternating order between sessions to avoid order effects.

Our design involved six treatments in six sessions[1]. In the first two treatments we induced half of the subjects with positive mood and half of the subjects with negative mood. The only difference between the first two treatments was that the order of the preference reversals and risk preferences task were alternated. In treatments 3 and 4, our control treatments, mood was only measured and not induced. The order of the preference reversals and the risk preferences task was also alternated in these treatments. Treatments 5 and 6 were similar to treatment 1 except that subjects in these treatments were all females and males, respectively. Table 1 shows the experimental design. We only used one proctor or monitor (i.e., one of the authors) for all sessions.

[1] In our very first session one of the subjects could not keep himself quiet during the experiment. Given the sensitivity of our design to contaminating mood behavior, we reran this session with a completely different set of subjects. Therefore, in total we ran seven sessions, the seventh being a re-run of treatment one. We dismissed data from session 1 from all further analysis since we considered these data contaminated.

Description of the experiment

A conventional lab experiment was conducted using the z-Tree software (Fischbacher 2007).[2] Subjects consisted of undergraduate students at the XXXX University (REMOVED FOR PEER REVIEW). During the recruitment, the nature of the experiment and the expected earnings were not mentioned. However, subjects were told that they will be given the chance to make more money during the experiment. Stochastic fees have been shown to be able to generate samples that are less risk averse than would otherwise have been observed (Harrison, Lau, and Rutström 2009).

The experimental design we adopted is exhibited in Table 1. Each subject participated in only one treatment. The size of the groups varied from 15 to 18 subjects per treatment. Each treatment lasted a little more than an hour. In total, 101 subjects participated in our experiments, which were conducted in March 2010.

Each session consisted of different phases: the training phase, the mood induction phase, the mood measurement phase, the preference reversal phase (split into the choice and the lottery auction tasks), and the post-auction phase[3]. Subjects were given clear prior instructions on the overall layout of the session and were also reminded about the procedures at the beginning of each phase.

The training phase

A second-price Vickrey auction (1961) was used to elicit subjects' values for lotteries[4]. After arriving at the lab, subjects were randomly assigned to a computer. Subjects were given €15 as a

[2] z-Tree is a software package designed to facilitate computer-based economic experiments. It has been used in numerous experiments as evident by the more than 1800 citations that the paper documenting the software has collected in Google scholar.

[3] We also included risk and time preference phases after the preference reversal phase but since these phases are not part of this paper's research focus, we are not giving a detailed discussion of these phases. In brief, we followed similar procedures reported in (Andersen et al. 2008)

[4] Admittedly, the choice of the valuation mechanism plays a crucial role in the accurate elicitation of homegrown values. For example, there is always a chance of disengaging some of the participants in auctions due to small number of winners. Shogren et al. (2001) found that the 2nd price auction worked better for on-margin bidders while the random *n*th price auction worked better for off-margin bidders. Rutström (1998) found that English auction bids are significantly lower than Vickrey auction bids, on average, and that there is a significantly smaller residual variance in English bids. Harrison (2006) and Harrison et al. (2004) emphasize the importance of having simultaneous bid submission rather than having real-time bid submission or real-time sequential bid submission such as in an English auction. Lusk and Rousu

participation fee at the end of the experiment. We emphasized that although they were not given the money at the beginning of the experiment, the €15 was theirs to use as they please and that they should think that they have this money already. To control for possible monetary endowment effects, subjects were also told that a random amount of money between €0.5 and €4 was going to be assigned to each one of them.[5] Everyone then received a random draw determining their individual-specific extra fee, which was added to their participation fee as soon as the computerized phase of the experiment began. We emphasized to the subjects that the endowment they received was private information and that they should not communicate this information to other subjects in the lab. All transactions were completed at the end of the experiment.

Subjects were given extensive training to fully familiarize them with the auction mechanism and to inform them that it is in their best interest to bid their true values (i.e., their dominant strategy). They were asked to watch a short PowerPoint presentation to familiarize them with the auction procedures. The presentation included a short explanation of the second-price auction, along with a numerical example demonstrating why it is in their best interest to bid truthfully. Subjects then took a short computerized quiz to determine if they thoroughly understood the experimental procedures. After the quiz, the monitor explained the correct answers and subjects were encouraged to ask questions about the auction procedures and their dominant strategy. Since we employed homegrown auction experiments, we wanted to make sure that all subjects were fully informed of the auction procedures and educated about their dominant strategy or the need to reveal their true WTP values. The type of extensive training we used in this study has been found to be effective in making subjects bid truthfully in Vickrey auctions (Drichoutis, Nayga, and Lazaridis 2010).

(2006) have found that on average the 2nd price auction and the *n*th price auction are more accurate than the BDM and Shogren, Cho et al. (2001) found that the WTP/WTA gap remains in a BDM mechanism while it disappears in active market environments like the 2nd and *n*th price auctions. Considering the different advantages and disadvantages and the different findings about the accuracy of valuation estimates of the various mechanisms, our choice (2nd price auction) was largely influenced by the popularity of the mechanism in the valuation literature. Our interest as well is on the "relative effect" of induced mood states on subjects' valuation so choice of auction mechanism should be less of a concern than when the objective is to examine the effect of moods on the effectiveness of a mechanism.

[5] In every step that involved random drawings by the computer, we reassured subjects that the drawing was fair and that extra care was taken by the programmer to make sure that this is the case.

Next, subjects bid in three practice *hypothetical* multi-product auction rounds.[6] The monitor emphasized that while these rounds were simply intended to further familiarize subjects with the auction procedure, they should bid as if they were in a real auction. The monitor also emphasized that one binding round and product would be randomly chosen at the end of these rounds. A screen displayed subjects' hypothetical payoffs after these rounds.

After getting the subjects fully familiarized with the auction mechanism and procedures, subjects then bid in three *real* multi-product auction rounds.[7] The monitor emphasized that these rounds were now real and that the highest bidder would actually pay for the products. Again, one round and one product were randomly chosen as binding at the end of these rounds. A screen displayed subjects' earnings after these rounds. To avoid the possibility of bids getting influenced by affiliated beliefs about the value of the products, we did not provide subjects information about observed bids or prices from the previous round. Instead, we only provided them with the ID of the winner from the previous round. Affiliated beliefs could arise when subjects anchor their bids to previously observed bids. Hence, between rounds the only available information given was subject's winning ID. The IDs were randomly distributed by the computer so no-one but the winner could identify the highest bidder.

The mood induction phase

Mood induction procedures have been widely used by psychologists. Capra et al. (2010) gave a brief summary of the different methods used in the psychology literature. In this study we used experience of success/failure as our mood induction procedure, similar to what was used in many other studies (Barone, Miniard, and Romeo 2000; Swinyard 1993, 2003; Capra 2004; Capra, Lanier, and Meer 2010; Hill and Ward 1989; Curtis 2006). This method has been used and favored by psychologists because it involves direct experience of mood. Specifically, subjects in the mood induction treatments were given a MENSA test that has to be completed within 6 minutes. Half of

[6] The products were a packet of gums, a bag of cookies and a bag of potato chips.
[7] The products we used were a Tobleron chocolate, a pack of Soft Kings cookies and Kraft's Lacta chocolate.

the subjects received a 16-question *hard* MENSA test and half of the subjects received an *easy* MENSA test (the tests are available at http://sites.google.com/site/moodauctions/).

The questions were first *pretested* in an online survey with a convenience sample using snowballing methods. Subjects were randomly exposed to one of the two versions. After taking the MENSA test, we then measured subjects' moods (see next subsection). In the *online* hard version, the pretest subjects answered on average 4.5 questions correctly while in the *online* easy version, the pretest subjects answered 12.9 questions. Their scores were displayed right after the time to complete the test expired, along with a phrase stating that the average person between 18-55 years old normally answers about 10 questions correctly, that 95% of the people answer at least 6 questions correctly and that only 5% answer more than 12 questions correctly. While this phrase was adopted from previous research on mood inducement, subjects in our online survey also received an average of 10 correct questions and have the same age distribution when averaging across both versions of the test. Since the phrase was effective in inducing mood (see next paragraph) and generally corresponded with the actual distribution of correct answers, we decided to use the same phrase for the lab auction experiment.

Given subjects' scores in the two versions, this feedback immediately placed the average subject in the *hard* version to the low 5% of the population while the average subject in the easy version was placed at the top 5%. This way subjects in the hard version experienced failure and subjects in the easy version experienced success. In a sample of 49 subjects in the online pretest, the two versions of the test were adequate in inducing different levels of positive affect (the null of equal scores on the positive affect scale was highly rejected on a t-test with a p-value of 0.02).

The procedure we discussed above is not new, has been validated, and has been used in several other studies (e.g., (Swinyard 1993; Barone, Miniard, and Romeo 2000; Swinyard 2003). To successfully complete the inducement phase in the lab, we did not tell subjects that they were being randomly exposed to different versions of the MENSA test or that the reference phrase given to them corresponded to the average of two versions of an online test. Subjects were only told that this phrase corresponds to the results obtained from another subject pool (i.e., information that corresponded to the performance of subjects from our online test)[8]. Subjects that answered the hard version of the test, scored significantly lower in the positive affect scale (discussed in the next paragraph). There was no significant difference between subjects with respect to the negative affect scale.

The mood measurement phase

To find ways to measure mood, we turned to the psychology literature for guidance. Watson and Vaidya (2003) provided a comprehensive overview of the dimensionality of the mood construct as well as on ways to measure its dimensions. Mood is usually depicted as a circular scheme with four bipolar dimensions that are spaced 45 degrees apart. The positive affect and negative affect dimensions are considered the most important measures of the higher order dimension.

The PANAS scale (Positive Affect Negative Affect Schedule; which was later subsumed into the PANAS-X) (Watson 1988) emerged as the standard measure of these constructs and has been widely used in the literature (Pocheptsova and Novemsky 2010; Bono and Ilies 2006; Pelled and Xin 1999; de Ruyter and Bloemer 1998; Pugh 2001). The terms comprising the PANAS-X Positive Affect scale are *active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud,* and *strong;* the items included in the Negative Affect scale are *afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared,* and *upset.* Subjects rated the extent to which they experienced each term right after inducement on a 5-point scale (1 = *very slightly or not at all,* 5 = *extremely*). In the lab the order of appearance of these terms was completely randomized. The scale has been thoroughly tested for reliability and validity (see Watson and Vaidya 2003).

[8] Another method for inducing moods is the use of film clips. However, an important limitation of the use of films is that there are no widely accepted sets of mood eliciting film stimuli, not to mention the challenge of finding film stimuli for culturally different or non-English speaking subjects.

The preference reversal phase

This phase typically includes two tasks; a *choice* task and an *auction* task. In the *choice* task subjects indicated their preference for each of the two pairs of lotteries with the understanding that one pair would be randomly selected as binding. Table 2 presents the bet pairs with their probabilities and expected payoffs. The ordering of bet pairs was randomized across subjects to avoid order effects.

Bet pairs were adopted from Cox and Grether (1996). Each bet pair included a "P-bet" and a "$-bet". A P-bet lottery involves a bet with a high probability of winning a modest amount and a low probability of losing an even more modest amount. A $-bet involves a bet with a modest probability of winning a large amount and a high probability of winning a modest amount. Typical preference reversal studies find that a significant fraction of subjects give prices that are opposite to the choices made out of the respective lotteries (see Seidl 2002 for a review of the literature). For bet pair 1, the bad outcome for the $-bet is worse than that for the P-bet and the opposite is true for bet pair 2.

In the *auction* task, subjects bid on the same four lotteries shown in Table 2, indicating how much, if anything, they were willing to pay to buy each lottery. Lottery order was again randomized across subjects. Subjects repeated the bidding task for five consecutive rounds with the understanding that only one lottery and one round would be randomly chosen as binding. Between the rounds, subjects observed *only* the winner's ID (2^{nd} highest price was not posted).

The post-auction phase

Subjects provided information about their age, household size and income. Experimental instructions are available at http://sites.google.com/site/moodauctions/.

Econometric analysis

Was the mood induction successful?

Figure 1 displays kernel density estimates of the affect scores for positive and negative affect, respectively. The vertical lines depict mean estimates of the scores per treatment.

Remember that a hard MENSA test aims to induce a negative mood to subjects and an easy MENSA test aims to induce a positive mood state through experience of failure and success, respectively. We are certain that subjects did experience success or failure given that those exposed to an easy MENSA test in the lab answered on average 12.9 questions correctly (out of 16) while those exposed to a hard MENSA test answered about 6 questions correctly.

It is obvious from panel A that the density function of positive affect for those exposed to the hard MENSA test is slightly shifted to the left implying lower scores for those exposed to the hard test. The density function of those exposed to the easy test has a slightly larger peak but is otherwise very close to the density function of the control group. One could tell a similar story based on the means (vertical lines) of the positive affect scores across treatments.

Panel B shows that both densities associated with the negative affect scores of those exposed to the easy and hard test are shifted right with respect to the control group. The density function of those exposed to the hard test is slightly more to the right but is practically indistinguishable from the density function of those exposed to an easy test. Comparing the means just reconfirms the above. These results hold up in a regression context. We run separate regressions for the positive affect and negative affect scales which are depicted in Table 4. The list of covariates includes dummies for those exposed to the easy and hard MENSA tests (the Control treatments, where mood was not induced, serve as the base category). We used demographic variables as additional control variables. Variable description is exhibited in Table 3.

Results are in agreement with Figure 1. Subjects that were exposed to a *hard* test scored significantly lower in the positive affect scale compared to subjects in a control group and those who took the *easy* test by almost 4 points. No statistically significant differences are observed between those answering an easy test and those in the control group. In all, it seems that our mood induction procedure was able to induce *lower* levels of positive affect to those that took the *hard* test.

On the other hand, both the *easy* and *hard* tests induced higher negative affect with respect to the control group by as much as 5 points which is also evident in Figure 1 where both density functions are shifted to the right. The *Hard* coefficient is larger than the *Easy* coefficient by one point (i.e., those exposed to a hard test had on average higher levels of negative affect) although their difference is not statistically significant. So why did both procedures induce higher negative affect? One explanation could be that the quiz-type procedure resembles exams that associate negatively with students' mood e.g., test anxiety. It is also important to remember that positive affect and negative affect are two dimensions of mood that can co-exist. The overall conclusion is that subjects that took the *hard* test had lower positive affect than subjects that took the *easy* test and there was no statistically significant difference in their negative affect level. They also exhibited less positive affect and higher negative affect than the control group.

Subjects that took the easy test had no statistically significant difference on positive affect with the control group. They also exhibited higher negative affect than the control group and similar negative affect levels with subjects that took the hard test. Our mood inducement procedures can therefore be considered successful when we compare results between the mood induction treatments.

Mood and subjects rationality

Assuming rationality, individuals' choices over two lotteries should rank lotteries the same way they are implicitly ranked when submitting bids to buy the lotteries in an experimental auction. Otherwise the subject commits a preference reversal. In Figure 2 the mean and median rates of a preference reversal is depicted when pooled across lotteries. Subjects that were induced into positive mood exhibit a smaller rate of committing a preference reversal both on average and at the median level. Preference reversals rates of the control group and those in the negative mood are almost identical at the median level and only marginally lower on average for the negative mood group (Figure 2, panel A) up to round 3.

The notion that both induced mood states reduce the rate of preference reversals is supported in the conditional analysis as well. To account for the panel nature of our data, we estimated a random parameters probit model, where the probability of observing a preference reversal is specified as:

$$\text{Prob}\left[y_t = 1\right] = F\begin{pmatrix} b_{0i} + b_{1i}Positive + b_{2i}Negative + b_{3i}t + b_{4i}Order + b_{5i}FemalesTreat \\ +b_{6i}MalesTreat + b_{7i}TotFee + b_8 Age + b_9 Gender + b_{10}HSize + b_{11}Educ_2 \\ +b_{12}Educ_3 + b_{13}Educ_4 + b_{14}Educ_5 + b_{15}Income_2 + b_{16}Income_3 + b_{17}Income_4 \end{pmatrix} \quad (1)$$

where t is a time trend variable, *Positive* (*Negative*) is a dummy indicating whether subjects where induced into positive (negative) mood, *Order* is a dummy indicating the order of the preference reversal and risk preferences tasks, *FemTreat* and *MalTreat* are dummies indicating sessions that only females and only males participated, respectively (i.e., not mixed), *TotFee* is the total fee endowed to each subject (recall a portion of this fee was randomly determined) and *F* is the standard normal cumulative distribution function. The rest of the variables are described in Table 3.

The beta parameters in the random parameters probit model are formulated as $\mathbf{b}_i = \mathbf{b} + \mathbf{\Sigma w}_i$, where $\mathbf{b}$ is the fixed means of the distributions for the random parameters, $\mathbf{\Sigma}$ is a nonnegative definite diagonal matrix of standard deviations and $\mathbf{w}_i$ is unobservable random term. For nonrandom parameters, some of the diagonal elements of $\mathbf{\Sigma}$ can be zero. Simulated Maximum Likelihood estimation (SML) can be used to estimate the model. The simulated log likelihood is maximized with respect to the elements of $\mathbf{b}_i$ and $\mathbf{\Sigma}$. We allowed the treatment variables to be formulated as random and set the diagonal elements of $\mathbf{\Sigma}$ at zero for the rest of the variables.

Coefficient estimates of a probit model are not directly interpretable, so we estimated the marginal changes exhibited in Table 5. Limdep v9 was used in all estimation steps.[9]

Both bet pairs produce similar results in terms of the direction of the effect. Some differences are observed in terms of the magnitude of the coefficients. We find that both positive and negative

[9] The random parameters models are favored in both cases (bet pairs) as compared to a random effects model based on the results from Likelihood Ratios tests (LR_{High}=41.12, p-value=0.00, LR_{Low}=25.56, p-value=0.00).

mood decrease the probability of a preference reversal with respect to a control group by as much as 24.5%. Positive mood has a larger effect than negative mood as evident in both bet pairs. For example, in the high expected payoff bet pair those induced into a positive mood were 20.6% less likely to commit a preference reversal (compared to the group where mood was not induced) while those in a negative mood where 5% less likely to commit preference reversals. The two figures are much closer when it comes to the low expected payoff bet pair. However, a test of the hypothesis that the *Negative* coefficient is equal to the *Positive* coefficient is highly rejected for both bet pairs.[10]

The order of the tasks did not have any effect on preference reversals given that the respective coefficients are neither economically or statistically significant. We find significant gender effects when comparing sessions that were conducted with females (males) only and mixed sessions. Females in the gender-specific sessions were 30.7% to 53% more likely to commit a preference reversal than those in the mixed sessions, while males in the gender-specific sessions were 6.4% less likely to commit a preference reversal than those in mixed sessions. However, the gender variable is positive which means that on average males were more likely to commit a preference reversal. Therefore, in terms of subjects' rationality and given that rationality is a key assumption of economic theory, mixed sessions where less beneficial for males but more beneficial for females in the sense that female (but not male) subjects were more in line with preference theory. Various demographic effects are also evident in Table 5.

Mood and bidding behavior

The average and median bids pooled over lotteries are exhibited in Figure 3. Subjects under positive mood bid lower than those under negative mood and the control group, both at the mean and median levels as evident in panels A and B. The difference grows across rounds and by round 5 the bids of the control group and those induced into positive mood differ by almost 0.60€ at the mean level and 0.55€ at the median level. Those under negative mood bid marginally lower than the

[10] To test for this hypothesis we imposed a linear restriction of the form $b_{Positive}=b_{Negative}$ and conducted a LR test (LR_{High}=10.31, p-value=0.00, LR_{Low}=8.50, p-value=0.00).

control group and the differences are practically indistinguishable at the median level. Bids tend to increase across rounds.

Table 6 shows results from estimating random parameters tobit models. We used tobit models to account for the censoring of the dependent variable. The specification is similar to the one we used for the probit models.

LR tests are in favor of the random coefficient model vis-à-vis the random effects models.[11] Results are qualitatively the same across lotteries although there are some notable differences. This is the reason why we also estimated a pooled model. The last column exhibits results from estimating a tobit model pooled across lotteries. Instead of using lottery dummies we used variables indicating probability of winning a positive amount of money (*ProbWin*), maximum amount of win (*MaxWin*) and maximum amount of loss (*MaxLoss*).

With respect to the treatment variables, positive mood has a negative statistically significant effect across lotteries. Subjects under positive mood were bidding €0.43 to €0.64 less than the control group (€0.61 for the pooled model). Subjects under negative mood bid lower than the control group for the low expected payoff lotteries (C and D) and bid more for one of the high expected payoff lotteries (B). Bids from these subjects exhibit no statistically significant difference with respect to lottery A. The pooled model shows that subjects under negative mood bid €0.25 less that the control group. We tested for equality of the *Positive* and *Negative* coefficients and the null was rejected in all cases.[12] The results for lotteries C, D and the pooled model are similar to Capra et al. (2010). A major difference however, it that we find stronger effects than they reported.

The time trend variable (rounds) is positive and statistically significant indicating that subjects increase bids across rounds by as much as €0.16 per round (lottery D). Females that were bidding on the gender-specific session bid higher over all lotteries (as compared to the mixed sessions) while males that participated in the gender-specific session bid higher for 3 out of 4

[11] LR_{LotA}=62.9 (p-value=0.00), LR_{LotB}=88.3 (p-value=0.00), LR_{LotC}=40.9 (p-value=0.00), LR_{LotD}=149.6 (p-value=0.00), LR_{Pooled}=76.52 (p-value=0.00)
[12] LR_{A}=7.77 (p-value=0.00), LR_{B}=4.95 (p-value=0.02), LR_{C}=5.73 (p-value=0.02), LR_{D}=15.00 (p-value=0.00), LR_{Pooled}=48.92 (p-value=0.00)

lotteries, and lower for one lottery. Bids were significantly higher in the gender-specific sessions than the mixed session as indicated by the magnitude of the coefficients. In all, it appears that bids in mixed gender sessions tend to be lower than bids in gender-specific sessions. Total money endowment (*TotFee*) has a significant effect as well, although the direction of the effect differs across lotteries. However, the magnitude of the effect is not substantial in every case. For lottery B the coefficient indicates that for every €1 endowed to the subject, s/he will bid almost 18% of it in the auction but only 5% of it for lottery A. For other lotteries the effect is close to zero. It looks like the effect of money endowment cancels out in the pooled model and is close to zero.

Several demographics effects are also evident in Table 6. For example males bid more than females for one of the high expected payoff lotteries (for lottery A by as much as €0.22) but bid less for the low expected payoff lotteries (for C and D lotteries by as much as €0.51).

Discussion and conclusions

Compared to other social sciences (e.g., the marketing literature) which have long recognized the importance of mood states on individual decision making, the economics profession has been relatively slower in accommodating psychological insights related to mood states. As Rabin (2002) puts it in his discussion about behavioral economics, "prominent skeptics have predicted that interest in the area will peter out as researchers realize that this latest craze offers little value". It is perhaps this skepticism over what may turn out to be a fad that makes many economists reluctant to bringing psychological insights into economics. However, the growing area of behavioral economics is testament to the increasing influence of psychological concepts in economic studies.

As far as we know, our paper is just the third paper in the field of economics that addresses the effect of positive and negative moods on decision making processes in laboratory auction settings. While we addressed the effect of mood states on bidding behavior (i.e., WTP) similar to the other two studies (i.e., Capra, Lanier, and Meer 2010; Lerner, Small, and Loewenstein 2004), we also focused on an issue that has not been examined: the effect of mood states on subject's rationality as represented by rate of preference reversal. Interestingly, we find that both positive and negative mood states induce subjects to being more "rational" (i.e., being less likely to commit a preference reversal) as compared to a control group (i.e., neutral mood) by as much as 24.5%. Admittedly, this finding is puzzling since it suggests that it would be better to have subjects with positive or negative moods than neutral moods at all. However, our results also suggest that positive mood has a larger negative effect on the probability of preference reversals; that is subjects exhibit more rational behavior under a positive mood state than under a negative mood state. So why does positive mood generate more rational behavior than negative mood and neutral mood? It is possible that negative or neutral mood makes people become less engaged on the task. In fact, Miner and Glomb (2010) found that positive mood is associated with improved task performance and Jordan and Lawrence (2006) related negative mood to negative performance. In contrast to our finding, however, Capra et al. (2010) found that positive mood generates biases in decision-making while negative mood provides biases not different from neutral mood. The reason for the difference in the results is not clear. However, they tested the impact of mood on the effectiveness of the auction mechanism while we analyzed moods on the rate of preference reversal.

We also explored how subjects bid on a homegrown value good (i.e., lotteries) under different mood states. This is in essence a reinvestigation of Capra et al. (2010) which used different homegrown value goods (lotteries vs. movie tickets) and different elicitation mechanisms (2^{nd} price auction vs. random n^{th} price auction). We generally find stronger mood effects than they did. Specifically, subjects in a positive mood state bid lower values than others (subjects bid lower as much as 0.65€ for one of the lotteries) while negative mood has different effects, depending on the expected value of the lottery. It is possible that positive mood inhibits competitiveness while negative mood enhances competitiveness. Our results are stronger than Capra et al.'s (2010) finding of weak mood effects, and consistent with what psychologists have generally found – that negative mood provides higher valuations than positive mood.

The two results of our study on preference reversals and bidding behavior should however not be viewed in isolation. For example, positive mood states have a strong negative effect on lottery valuation. The magnitude of the effect is however different across lotteries. It is then possible that mood states affect the relative valuation of the lotteries, consisting of the bet pair, which in turn affects the rate of preference reversals. Hence, mood states may not necessarily change preferences per se. Perhaps mood states put a cost on overpricing certain lotteries similar to what happens in situations with market-like arbitrage (Gunnarsson, Shogren, and Cherry 2003).

It is worth noting that Lerner et al. (2004) when they induced subjects in what they call "sad" state (similar to our negative mood state) observed a reverse endowment effect; that is choice prices (somewhat different to buying prices) are higher than selling prices. In addition, choice prices were higher than the control treatment and selling prices were lower than the control treatment. The positive effect on valuations is in contrast to both our study and Capra et al. (2010). One could also claim that perhaps mood states altered risk preferences which in turn may have made some lotteries more or less attractive. However, consistent with Walser and Eckel (2010), we found using some additional data we collected (REFERENCE REMOVED FOR PEER REVIEW) that mood does not affect risk preferences. Capra et al. (2010) found similar effects (albeit weaker) on homegrown value auctions using movie tickets (and not lotteries). Hence, we claim that changes in bids could not have been due to changes in risk aversion.

Another interesting finding we discovered from this study is that regardless of mood states, males tend to commit a higher rate of preference reversal than females in mixed gender sessions. However, females tend to commit higher rate of preference reversal in female only sessions than in mixed sessions while males tend to commit a lower rate of preference reversal when in male only sessions than in mixed sessions. As far as we know, this is a relatively new finding in the literature. It is not clear why males tend to commit higher rates of preference reversal but it is possible that males react more strongly than females in environments such as auctions. Gneezy, Niederle, and Rustichini (2003), Gneezy and Rustichini (2004) and, Niederle and Vesterlund (2007) found that women generally react less strongly to competition incentives (i.e., piece rates versus tournament rate) due to negative attitudes towards competition and risk averseness. Women also tend to be more altruistic and cooperative. However, based on the results of our same-gender sessions, it is possible that women's and men's interest and reactions to auctions change, regardless of mood states, when they are put in an all-female and all-male environments, respectively. More research on this topic is indeed needed.

Our findings have significant implications for experimental auctions with price discovery objectives, where the general aim is to elicit truthful bids from subjects. Since our results imply that moods can influence bidding behavior and rate of preference reversal, then it would be prudent to measure moods of subjects and control for mood effects when modeling auction data. Alternatively, albeit less practical and perhaps more controversial, since positive mood tends to provide less preference reversals than negative mood, it might also be proper to just randomly select subjects who have positive mood in experimental auctions, assuming no selection issues involved.

Our results also have significant implications for decision making in general. Conventional wisdom dictates that decision makers should act using a "cool head" where decisions should come only from rational and cognitive processes that can obtain the best results (Sayegh, Anthony, and Perrewe 2004). Our results imply that the existence of moods during decision making processes can have profound effects on economic results and markets. Of course, more research is needed to test the robustness of our results both in the lab and in the field. This topic could indeed be a prime area for future research.

References

Andersen, S, GW Harrison, MI Lau, and EE Rutstrom (2008) Eliciting risk and time preferences. Econometrica 76 (3), 583-618.

Atalay, AS, and MG Meloy (2011) Retail therapy: A strategic effort to improve mood. Psychology and Marketing 28 (6), 638-659.

Barger, PB, and AA Grandey (2006) Service with a smile and encounter satisfaction: Emotional contagion and appraisal mechanisms. Academy of Management Journal 49, 1229–1238.

Barone, MJ, PW Miniard, and JB Romeo (2000) The influence of positive mood on brand extension evaluations. The Journal of Consumer Research 26 (4), 386-400.

Batra, R, and DM Stayman (1990) The role of mood in advertising effectiveness. The Journal of Consumer Research 17 (2), 203-214.

Bono, JE, and R Ilies (2006) Charisma, positive emotions and mood contagion. The Leadership Quarterly 17 (4), 317-334.

Booth, AL, and PJ Nolen (2009a) Choosing to compete: How different are girls and boys? CEPR Discussion Paper No. 7214, March.

Booth, AL, and PJ Nolen (2009b) Gender differences in risk behaviour: Does nurture matter? CEPR Discussion Paper No. 7198, March.

Bosman, R, M Sutter, and F van Winden (2005) The impact of real effort and emotions in the power-to-take game. Journal of Economic Psychology 26 (3), 407-429.

Bosman, R, and F van Winden (2002) Emotional hazard in a power-to-take experiment. The Economic Journal 112 (476), 146-169.

Bruni, L, and R Sugden (2007) The road not taken: How psychology was removed from economics, and how it might be brought back. The Economic Journal 117 (January), 1-28.

Capra, CM (2004) Mood-driven behavior in strategic interactions. The American Economic Review 94 (2), 367-372.

Capra, CM, K Lanier, and S Meer (2010) The effects of induced mood on bidding in random nth-price auctions. Journal of Economic Behavior & Organization (In press).

Capra, MC, S Meer, and K Lanier (2006) The effects of induced mood on bidding in random Nth-price auctions. working paper.

Clark, LA, and D Watson. (1994) Distinguishing functional from dysfunctional affective responses. In: P. Ekman and R. J. Davidson (eds) The nature of emotion: Fundamental questions. New York: Oxford University Press. pp: 131-136

Cox, JC, and DM Grether (1996) The preference reversal phenomenon: response mode, markets and incentives. Economic Theory 7, C381-C405.

Cubitt, RP, A Munro, and C Starmer (2004) Testing explanations of preference reversal. The Economic Journal 114 (497), 709-726.

Curren, MT, and KR Harich (1994) Consumers' mood states: The mitigating influence of personal relevance on product evaluations. Psychology & Marketing 11 (2), 91-107.

Curtis, MB (2006) Are audit-related ethical decisions dependent upon mood? Journal of Business Ethics 68 (2), 191-209.

de Ruyter, K, and J Bloemer (1998) Customer loyalty in extended service settings. The interaction between satisfaction, value attainment and positive mood. International Journal of Service Industry Management 10 (3), 320-336.

de Vries, M, O Corneille, E Rondeel, and CLM Witteman (2010) Mood effects on dominated choices: Positive mood induces departures from logical rules. Journal of Behavioral Decision Making (forthcoming).

de Vries, M, RW Holland, and CLM Witteman (2008) In the winning mood: Affect in the Iowa Gambling Task. Judgment and Decision Making 3 (1), 42-50.

Dowling, M, and BM Lucey (2008a) Mood and UK equity pricing. Applied Financial Economics Letters 4 (4), 233 - 240.

Dowling, M, and BM Lucey (2008b) Robust global mood influences in equity pricing. Journal of Multinational Financial Management 18 (2), 145-164.

Drichoutis, AC, RM Nayga, Jr., and P Lazaridis (2010) The role of training in experimental auctions. American Journal of Agricultural Economics (forthcoming).

Elster, J (1998) Emotions and economic theory. Journal Article 36 (1), 47-74.

Englich, B, and K Soder (2009) Moody experts --- How mood and expertise influence judgmental anchoring. Judgment and Decision Making 4 (1), 41-50.

Fedorikhin, A, and VM Patrick (2010) Positive mood and resistance to temptation: The interfering influence of elevated arousal. The Journal of Consumer Research (forthcoming).

Fischbacher, U (2007) z-Tree: Zurich Toolbox for Ready-made Economic Experiments. Experimental Economics 10 (2), 171-178.

Gardner, MP (1985) Mood states and consumer behavior: A critical review. The Journal of Consumer Research 12 (3), 281-300.

Gardner, MP, and RP Hill (1988) Consumers' mood states: Antecedents and consequences of experiential versus informational strategies for brand choice. Psychology & Marketing 5 (2), 169-182.

Gardner, MP, and RP Hill (1989) Consumers' mood states and the decision-making process. Marketing Letters 1 (3), 229-238.

Gneezy, U, KL Leonard, and JA List (2009) Gender differences in competition: Evidence from a matrilineal and a patriarchal society. Econometrica 77 (5), 1637-1664.

Gneezy, U, M Niederle, and A Rustichini (2003) Performance in competitive environments: Gender differences. The Quarterly Journal of Economics 118 (3), 1049-1074.

Gneezy, U, and A Rustichini (2004) Gender and competition at a young age. The American Economic Review 94 (2), 377-381.

Grable, JE, and MJ Roszkowski (2008) The influence of mood on the willingness to take financial risks. Journal of Risk Research 11 (7), 905-923.

Grether, DM, and CR Plott (1979) Economic theory of choice and the preference reversal phenomenon. American Economic Review 69 (4), 623-638.

Grund, C, and D Sliwka (2005) Envy and compassion in tournaments. Journal of Economics & Management Strategy 14 (1), 187-207.

Gunnarsson, S, JF Shogren, and TL Cherry (2003) Are preferences for skewness fixed or fungible? Economics Letters 80 (1), 113-121.

Harrison, GW (2006) Experimental evidence on alternative environmental valuation methods. Environmental & Resource Economics 36, 125-162.

Harrison, GW, RM Harstad, and EE Rutström (2004) Experimental methods and elicitation of values. Experimental Economics 7 (2), 123-140.

Harrison, GW, E Johnson, MM McInnes, and EE Rutstrom. (2007) Measurement with experimental controls. In: M. Boumans (eds) Measurement in economics: A handbook. San Diego, California: Elsevier Inc. pp:

Harrison, GW, MI Lau, and EE Rutström (2009) Risk attitudes, randomization to treatment, and self-selection into experiments. Journal of Economic Behavior & Organization 70 (3), 498-507.

Harrison, GW, and JA List (2004) Field experiments. Journal Article 42 (4), 1009-1055.

Hill, RP, and JC Ward (1989) Mood manipulation in marketing research: An examination of potential confounding effects. Journal of Marketing Research 26 (1), 97-104.

Izard, CE. (1991) The psychology of emotions. New York: Plenum Press

Johnson, EJ, M Steffel, and DG Goldstein (2005) Making better decisions: From measuring to constructing preferences. Health Psychol. 24 (4), S17–S22.

Jordan, PJ, and SA Lawrence (2006) The impact of negative mood on team performance. Journal of Management & Organization 12 (2), 131-145.

Kamstra, MJ, LA Kramer, and MD Levi (2000) Losing sleep at the market: The daylight saving anomaly. The American Economic Review 90 (4), 1005-1011.

Karni, E, T Salmon, and B Sopher (2008) Individual sense of fairness: An experimental study. Experimental Economics 11 (2), 174-189.

Kirchsteiger, G, L Rigotti, and A Rustichini (2006) Your morals might be your moods. Journal of Economic Behavior & Organization 59 (2), 155-172.

Kliger, D, and O Levy (2003) Mood and Judgment of Subjective Probabilities: Evidence from the U.S. Index Option Market. European Finance Review 7 (2), 235-248.

Knowles, PA, SJ Grove, and W Burroughs (1993) An experimental examination of mood effects on retrieval and evaluation of advertisement and brand information. Journal of the Academy of Marketing Science 21 (2), 135-142.

Larsen, RJ (2000) Toward a science of mood regulation. Psychological Inquiry 11 (3), 129-141.

Lawson, R. (1985) The effects of mood on retrieving consumer product information. In: E. C. Hirschman and M. B. Holbrook (eds) Advances in Consumer Research. Provo, UT: Association for Consumer Research. pp: 399-403

Lee, AY, and B Sternthal (1999) The effects of positive mood on memory. The Journal of Consumer Research 26 (2), 115-127.

Lerner, JS, DA Small, and G Loewenstein (2004) Heart strings and purse strings: Carryover effects of emotions on economic decisions. Psychological Science 15 (5), 337-341.

Lichtenstein, S, and P Slovic. (2006) The construction of preference. Cambridge, UK: Cambridge University Press

Lusk, JL, and M Rousu. (2006) Market price endogeneity and accuracy of value elicitation mechanisms. In: J. A. List (eds) Using experimental methods in environmental and resource economics: Edward Elgar. pp:

Meloy, MG (2000) Mood-driven distortion of product information. The Journal of Consumer Research 27 (3), 345-359.

Meloy, MG, EJ Russo, and E Gelfand Miller (2006) Monetary incentives and mood. Journal of Marketing Research 43 (2).

Miner, AG, and TM Glomb (2010) State mood, task performance, and behavior at work: A within-persons approach. Organizational Behavior and Human Decision Processes 112 (1), 43-57.

Niederle, M, and L Vesterlund (2007) Do women shy away from competition? Do men compete too much? The Quarterly Journal of Economics 122 (3), 1067-1101.

Park, J, SJ Lennon, and L Stoel (2005) On-line product presentation: Effects on mood, perceived risk, and purchase intention. Psychology & Marketing 22 (9), 695-719.

Payne, JW, JR Bettman, and DA Schkade (1999) Measuring constructed preferences: Towards a building code. Journal of Risk and Uncertainty 19 (1), 243-270.

Pelled, LH, and KR Xin (1999) Down and out: An investigation of the relationship between mood and employee withdrawal behavior. Journal of Management 25 (7), 875-895.

Pocheptsova, A, and N Novemsky (2010) When do incidental mood effects last? Lay beliefs versus actual effects. The Journal of Consumer Research 36 (6), 992-1001.

Pugh, DS (2001) Service with a smile: Emotional contagion in the service encounter. Academy of Management Journal 44 (5), 1018-1027.

Qiu, C, and CWM Yeung (2008) Mood and comparative judgment: Does mood influence everything and finally nothing? The Journal of Consumer Research 34 (5), 657-669.

Rabin, M (1998) Psychology and economics. Journal Article 36 (1), 11-46.

Rabin, M (2002) A Perspective on Psychology and Economics. European Economic Review 46, 657-685.

Raghunathan, R, and JR Irwin (2001) Walking the hedonic product treadmill: Default contrast and mood-based assimilation in judgments of predicted happiness with a target product. The Journal of Consumer Research 28 (3), 355-368.

Reuben, E, and F van Winden (2008) Social ties and coordination on negative reciprocity: The role of affect. Journal of Public Economics 92 (1-2), 34-53.

Roehm, HJ, and ML Roehm (2005) Revisiting the effect of positive mood on variety seeking. The Journal of Consumer Research 32 (2), 330-336.

Rutström, EE (1998) Home-grown values and incentive compatible auction design. International Journal of Game Theory 27, 427-441.

Sar, S, BR Duff, and G Anghelcev (2011) If you feel it now you will think it later: The interactive effects of mood over time on brand extension evaluations. Psychology and Marketing 28 (6), 561-583.

Saunders, EMJ (1993) Stock prices and Wall Street weather. The American Economic Review 83 (5), 1337-1345.

Sayegh, L, WP Anthony, and PL Perrewe (2004) Managerial decision-making under crisis: The role of emotion in an intuitive decision process. Human Resource Management Review 14 (2), 179-199.

Schmidt, U, C Starmer, and R Sugden (2008) Third-generation prospect theory. Journal of Risk and Uncertainty 36 (3), 203-223.

Seidl, C (2002) Preference reversal. Journal of Economic Surveys 16 (5), 621-655.

Shogren, JF, S Cho, C Koo, JA List, C Park, P Polo, and R Wilhelmi (2001) Auction mechanisms and the measurement of WTP and WTA. Resource and Energy Economics 23 (2), 97-109.

Shogren, JF, M Margolis, C Koo, and JA List (2001) A random nth-price auction. Journal of Economic Behavior and Organization 46 (4), 409-421.

Sirakaya, E, J Petrick, and H-S Choi (2004) The role of mood on tourism product evaluations. Annals of Tourism Research 31 (3), 517-539.

Slovic, P (1995) The construction of preference. Am. Psychol. 50 (5), 364-371.

Slovic, P, and S Lichtenstein (1968) Relative importance of probabilities and payoffs in risk taking. J. Exp. Psychol. 78 (3, Part 2), 1-18.

Spies, K, F Hesse, and K Loesch (1997) Store atmosphere,mood and purchasing behavior. International Journal of Research in Marketing 14, 1-17.

Swinyard, WR (1993) The effects of mood, involvement, and quality of store experience on shopping intentions. The Journal of Consumer Research 20 (2), 271-280.

Swinyard, WR (2003) The effects of salesperson mood, shopper behavior, and store type on customer service. Journal of Retailing and Consumer Services 10 (6), 323-333.

Vickrey, W (1961) Counterspeculation, auctions, and competitive sealed tenders. Journal of Finance 16 (1), 8-37.

Walser, S, and C Eckel (2010) The effect of mood on risk and trust preferences: An experimental study. Working paper Department of Economics, University of Texas at Dallas.

Watson, D (1988) The vicissitudes of mood measurement: Effects of varying descriptors, time frames, and response formats on measures of Positive and Negative Affect. J. Pers. Soc. Psychol. 55 (1), 128-141.

Watson, D, and J Vaidya. (2003) Mood measurement: Current status and future directions. In: J. A. Schinka and W. F. Velicer (eds) Handbook of Psychology, Volume 2: Research Methods in Psychology. New york: Wiley. pp: 351-375

White, CJ (2006) Towards an understanding of the relationship between mood, emotions, service quality and customer loyalty intentions. The Service Industries Journal 26 (8), 837-847.

Table 1. Experimental design

Treatments	Mood inducement	Subject pool	Order of Tasks
1	Yes, Positive-Negative	Mixed	Preference Reversals – Risk Preferences
2	Yes, Positive-Negative	Mixed	Risk Preferences – Preference Reversals
3	No	Mixed	Preference Reversals – Risk Preferences
4	No	Mixed	Risk Preferences – Preference Reversals
5	Yes, Positive-Negative	Females	Preference Reversals – Risk Preferences
6	Yes, Positive-Negative	Males	Preference Reversals – Risk Preferences

Table 2. Lotteries used in the experiment

Lottery	Bet type	Bet pair	Probability of win	Amount of win	Probability of loss	Amount of loss	Expected payoff
A	P-bet	1	90%	4	10%	1	3.50
B	$-bet		28%	16	72%	1.5	3.40
C	P-bet	2	75%	2	25%	1	1.25
D	$-bet		18%	9	82%	0.5	1.21

Table 3. Variable description

Variable	Variable description	Mean	SD
Age	Subject's Age	20.614	1.673
Gender	Dummy, 1=male	0.416	0.495
Hsize	Household size	4.307	0.997
$Educ_1$*	Dummy, 1st year student	0.198	0.400
$Educ_2$	Dummy, 2nd year student	0.129	0.337
$Educ_3$	Dummy, 3rd year student	0.366	0.484
$Educ_4$	Dummy, 4th year student	0.168	0.376
$Educ_5$	Dummy, 5th year student	0.139	0.347
$Income_1$*	Dummy, Household's economic position is good, very good or above average	0.059	0.238
$Income_2$	Dummy, Household's economic position is average	0.515	0.502
$Income_3$	Dummy, Household's economic position is below average	0.208	0.408
$Income_4$	Dummy, Household's economic position is bad or very bad	0.218	0.415
Positive (*Hard*)	Dummy, Subject is induced into positive mood (exposed to hard MENSA test)	0.337	0.475
Negative (*Easy*)	Dummy, Subject is induced into negative mood (exposed to easy MENSA test)	0.356	0.481
*Control**	Dummy, Subject's mood is not induced	0.307	0.464
T	Time trend (Round)	3.000	1.415
Order	Dummy, Preference reversal task is conducted first	0.663	0.475
FemTreat	Dummy, only females in the session	0.178	0.385
MalTreat	Dummy, only males in the session	0.168	0.376
*Mixed**	Dummy, mixed gender sessions	0.653	0.478

TotFee	Total money endowment	17.208	1.219

* Removed from estimations.

Table 4. Regression results for positive and negative affect

	Positive affect		Negative affect	
	Coef.	Std.Error	Coef.	Std.Error
Constant	**43.577****	**17.847**	**45.698*****	**13.765**
Easy	0.549	1.711	**3.917*****	**1.319**
Hard	**-3.776****	**1.703**	**5.013*****	**1.313**
Age	-0.078	0.944	**-1.796****	**0.728**
Gender	0.566	1.394	**2.277****	**1.075**
Hsize	-0.187	0.671	-0.325	0.518
$Educ_2$	-1.287	2.485	0.908	1.916
$Educ_3$	-3.092	2.756	**3.779***	**2.126**
$Educ_4$	-2.239	3.858	**5.124***	**2.976**
$Educ_5$	-1.917	4.926	**7.057***	**3.799**
$Income_2$	-4.826	2.990	1.320	2.306
$Income_3$	-5.018	3.187	3.394	2.458
$Income_4$	-0.334	3.164	0.387	2.440
R-squared	0.187		0.254	
Adj. R-squared	0.076		0.153	

Note: ***, **, * = Significance at 1%, 5%, 10% level.

Table 5. Marginal effects and discrete changes (Probit models)

		High expected payoff bet pair		Low expected payoff bet pair	
		Coef.	Std.Error	Coef.	Std.Error
Non-random	*Age*	0.009	0.007	0.005	0.035
	Gender	**0.075***	**0.041**	**0.338*****	**0.074**
	Hsize	**-0.015*****	**0.005**	**-0.067****	**0.027**
	$Educ_2$	**-0.017****	**0.007**	-0.083	0.060
	$Educ_3$	0.095	0.069	0.045	0.105
	$Educ_4$	0.012	0.041	**-0.159****	**0.066**
	$Educ_5$	0.501	0.355	0.039	0.220
	$Income_2$	0.057	0.051	**-0.677*****	**0.079**
	$Income_3$	0.106	0.131	**-0.258*****	**0.037**
	$Income_4$	0.382	0.242	**-0.287*****	**0.039**
Random	*Positive*	**-0.206*****	**0.050**	**-0.245*****	**0.047**
	Negative	**-0.050*****	**0.017**	**-0.228*****	**0.050**
	T	0.004	0.004	**-0.030****	**0.014**
	Order	-0.042	0.027	-0.005	0.057
	FemTreat	**0.307****	**0.143**	**0.529*****	**0.117**
	MalTreat	**-0.064*****	**0.018**	-0.040	0.079
	TotFee	0.005	0.005	0.003	0.018

Note: ***, **, * = Significance at 1%, 5%, 10% level.

Table 6. Marginal effects and discrete changes (Tobit models)

		Lottery A		Lottery B		Lottery C		Lottery D		Pooled over lotteries	
		Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error
Non-random	*Age*	0.031	0.033	**-0.080****	**0.039**	**-0.108*****	**0.024**	**0.107*****	**0.033**	0.014	0.019
	Gender	**0.226*****	**0.062**	0.089	0.067	**-0.206*****	**0.042**	**-0.511*****	**0.060**	-0.019	0.036
	HSize	-0.026	0.024	**0.263*****	**0.026**	**-0.086*****	**0.016**	0.010	0.022	**0.060*****	**0.014**
	$Educ_2$	ā0.006	0.090	-0.081	0.097	-0.069	0.063	**-0.206****	**0.085**	-0.041	0.053
	$Educ_3$	-0.123	0.101	**0.722*****	**0.115**	**0.247*****	**0.074**	**-0.459*****	**0.098**	**-0.121****	**0.060**
	$Educ_4$	-0.039	0.147	**0.890*****	**0.165**	0.066	0.104	**-0.544*****	**0.130**	-0.065	0.087
	$Educ_5$	**-0.449*****	**0.173**	0.278	0.208	**0.580*****	**0.131**	**-1.015*****	**0.097**	-0.147	0.105
	$Income_2$	**0.326*****	**0.114**	**-0.793*****	**0.106**	**-0.259*****	**0.084**	**-0.373*****	**0.096**	**-0.346*****	**0.060**
	$Income_3$	**0.857*****	**0.123**	**-0.287****	**0.115**	**0.198****	**0.091**	-0.100	0.105	0.077	0.063
	$Income_4$	**0.426*****	**0.120**	**-0.447*****	**0.107**	**-0.204****	**0.084**	**-0.689*****	**0.091**	**-0.233*****	**0.063**
	ProbWin	-	-	-	-	-	-	-	-	**3.560*****	**0.204**

	MaxWin	-	-	-	-	-	-	-	-	**0.213*** **	**0.013**
	MaxLoss	-	-	-	-	-	-	-	-	**-1.595*** **	**0.108**
Random	*Positive*	**-0.430*** **	**0.068**	**-0.518*** **	**0.073**	**-0.647*** **	**0.037**	**-0.541*** **	**0.064**	**-0.614*** **	**0.050**
	Negative	-0.100	0.067	**0.257*** **	**0.072**	**-0.274*** **	**0.044**	**-0.199*** **	**0.065**	**-0.250*** **	**0.040**
	t	**0.137*** **	**0.015**	**0.136*** **	**0.017**	**0.051*** **	**0.011**	**0.156*** **	**0.014**	**0.113*** **	**0.010**
	Order	**-0.374*** **	**0.058**	**0.459*** **	**0.062**	**-0.163*** **	**0.040**	**0.478*** **	**0.054**	**0.156*** **	**0.034**
	FemTreat	**0.164** **	**0.082**	**0.279*** **	**0.090**	**0.496*** **	**0.060**	**0.292*** **	**0.077**	**0.328*** **	**0.050**
	MalTreat	**0.413*** **	**0.092**	**-0.717*** **	**0.090**	**0.277*** **	**0.066**	**0.537*** **	**0.094**	-0.013	0.055
	TotFee	**-0.047** **	**0.020**	**0.178*** **	**0.022**	-0.018	0.014	**0.117*** **	**0.019**	-0.009	0.012

Note: ***, **, * = Significance at 1%, 5%, 10% level.

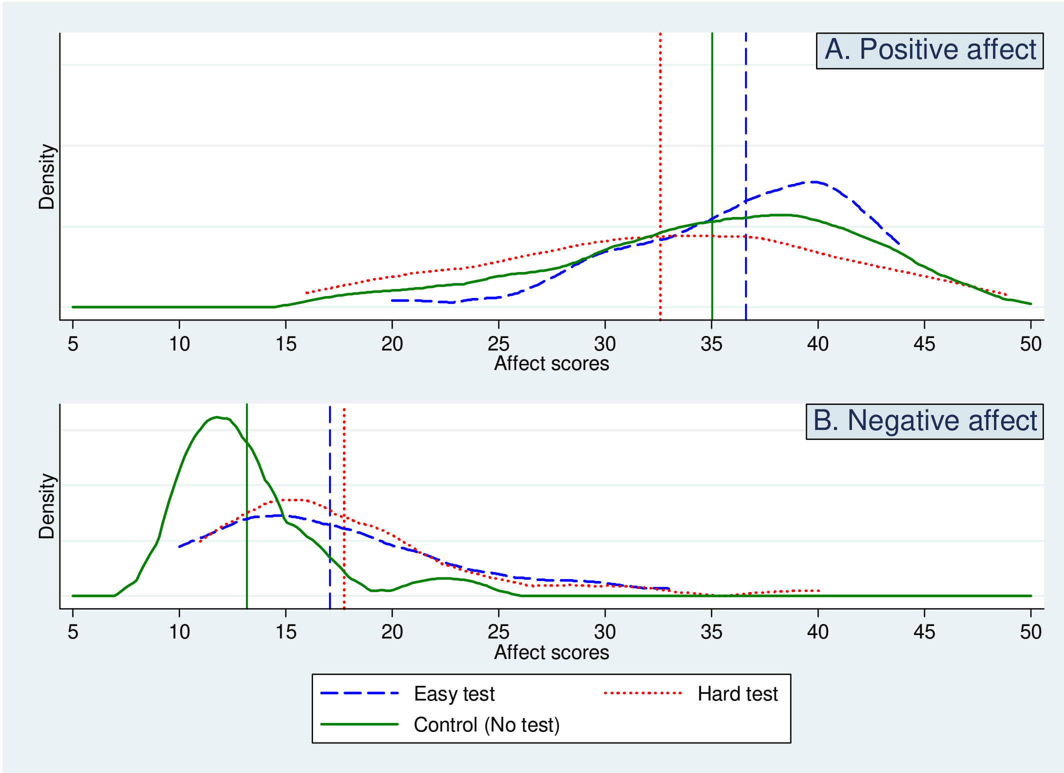

Figure 1. Kernel density estimates for affect scores

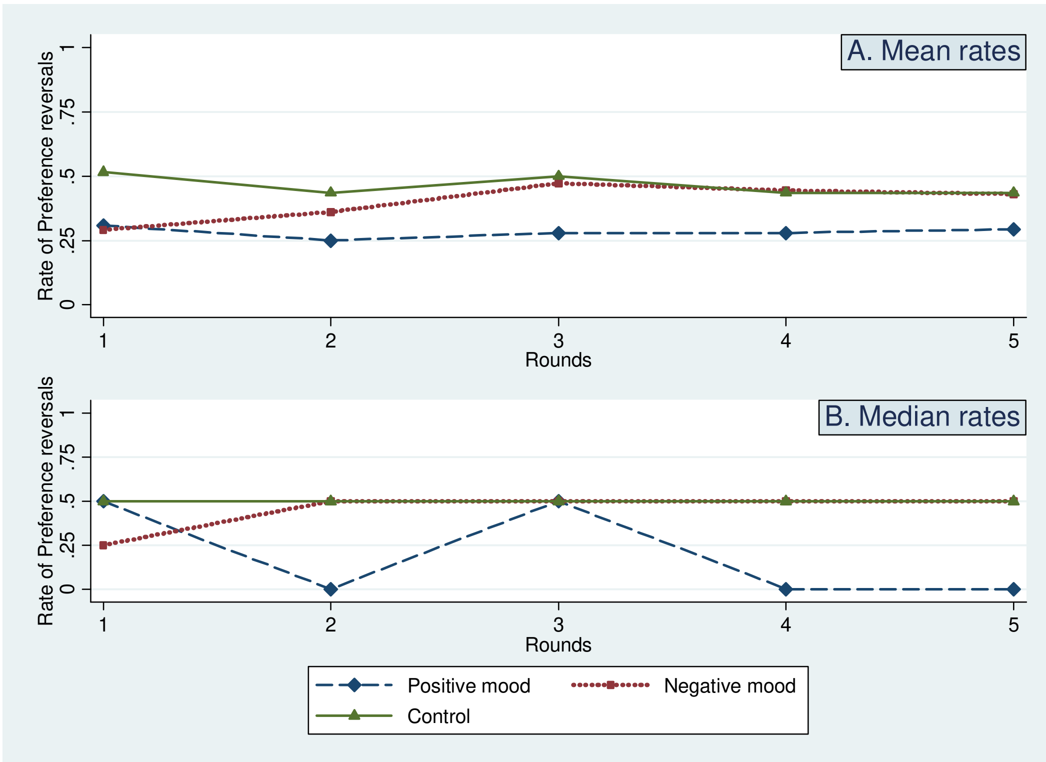

Figure 2. Average and median rates of a preference reversal pooled over bet pairs

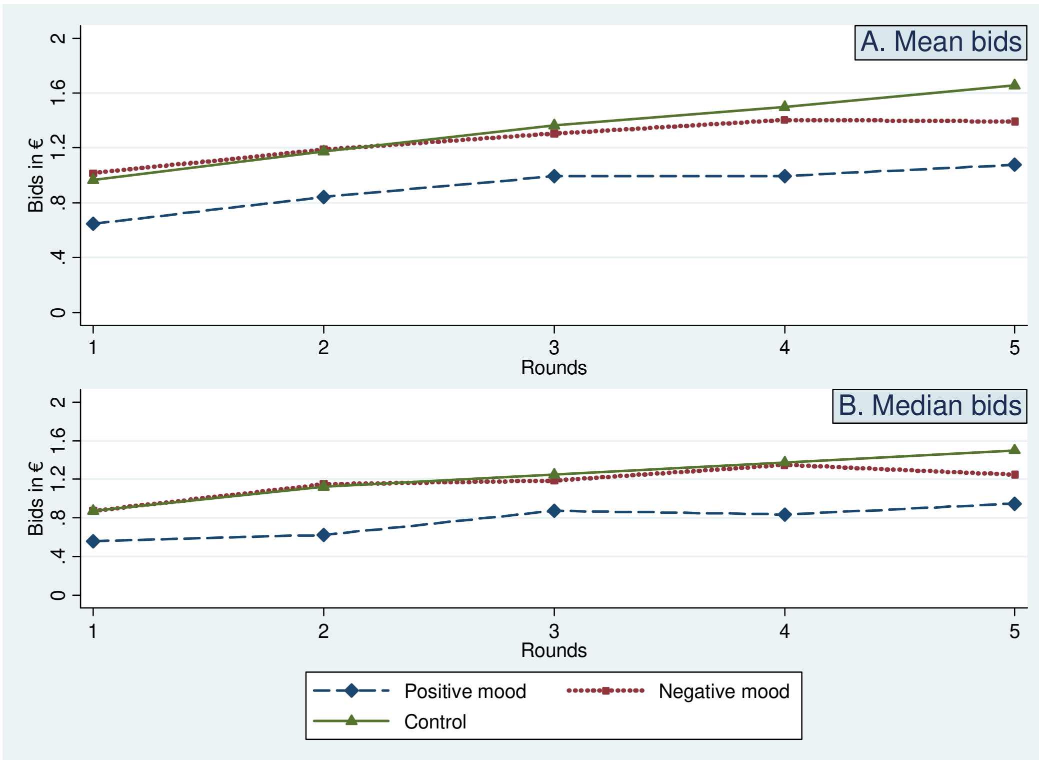

Figure 3. Average and median bids pooled over lotteries