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Chapter 1

Introduction

Decision making is influenced by numerous factors that cloud the researcher's view of underlying causalities. Moreover, making different decisions might influence the human well-being differently. In this essay, I employ field and experiments, develop survey tools and analyze data set to better understand individual's decision making and its psychological underpinnings, generating insights to inform theory as well as real world decision makers. To this aim, I focus on two main spheres: decision making through the time (intertemporal choices) and the consequence of decision over the money (saving or spending) on human well-being.

This essay is organized as follows: the first chapter discusses a dynamic experiment in the area of anticipatory feelings in intertemporal choice on consumption. The discounted-utility model (DU) of intertemporal choice predicts that only abstinence from present-time utility matters and the intertemporal choice is not affected by the kind of good or money at stake. The DU model has been effectively challenged by the hyperbolic discounting model (HD), which builds upon a series of behavioural anomalies with respect to the intertemporal choice with a constant rate of discount. The HD model convincingly states that the discount rate is not necessarily constant as a choice reversal could be caused by impatience through a rise in the discount rate. Yet, extensive evidence of reversal in intertemporal choice goes well beyond the experimental results shown in the HD literature. In this study, I investigate the causes behind the choice reversal, as procrastination of consumption good, by employing the evaluation of anticipatory feelings. To this

aim, I adopt a dynamic experiment protocol over multiple points of the time. It allows me to disentangle anticipatory feelings from uncertainty and intertemporal consistency in intertemporal choices. I found that anticipatory feeling might be a significant possible explanation behind the choice reversal.

The second chapter discusses an experimental study comparing happiness between US Americans and Germans regarding their behaviors in saving and spending the money. In this chapter, I approach the relation between money and happiness by concentrating on two functions of money (saving and spending) and explore how happiness is affected by them. I compare participants from two different countries with a similar level of wealth and development (Germany and the USA) and explore how cultural differences may affect the individual`s behavior regarding money and happiness. I also explore how social status affects happiness and how this differs between Americans and Germans. I collect data from a computer based experiment which was completed by a total of N=105 participants. With a set of standard questions, I measure the participants` risk aversion, time preference, competitiveness and their self-classified demand for saving and spending. My main findings are: First, German self-classified savers who save and American self-classified spenders who spend are happier; Secondly, people receive happiness not only from absolute wealth, but also from relative wealth in comparison to others; Thirdly, relative wealth (social rank) is significantly more important to Americans than to Germans.

Chapter 2

Anticipatory Feelings in Intertemporal Choice on Consumption: A Dynamic Experiment[1]

Keywords: *Intertemporal decisions; Choice reversal; Anticipatory feelings; Dynamic experiment*

2.1. Introduction

Many theoretical and methodological questions are still to be solved in the theoretical framework of intertemporal decision making. Experimental research tries to give some insight on that matter, in order to more deeply understand the explicative and predictive capability of competing theories, and the role of emotional versus cognitive biases in these settings. The discounted-utility model (DU) (Samuelson, 1937) of intertemporal choice replicates in the dimension of time the axiomatic of rational choice delivering the optimal aggregation of expected prospects. This standard model explains the choice between present and future consumption as the once-for-ever choice portrayed by the exponential utility function, where the value of the discount rate is constant across time. This analytical presentation nicely fits with the view of the agent of rational choice theory, whereby the abstinence from present consumption allows the accumulation of financial assets, which will be sold at the end of the working life in order to fund the consumption of the individual during his retirement.

[1] This chapter is co-authored with Daniela Di Cagno, LUISS Guido Carli, and Francesco Farina, University of Siena.

The intertemporal choice centered on the hyper-rational agent of the DU model, has been challenged by overwhelming evidence of anomalies in the intertemporal choice exhibited by experiments both over money or consumption. Among the violation of theoretical predictions observed in the lab, a "bias for the present", the phenomenon of reversal of preferences, was quite often detected (from 28% to 41% across subjects).[2] The hyperbolic discounting model (HD) has been set up[3] after systematic deviations from rational deliberation, for all the subsequent periods with respect to the time in which the subject makes his intertemporal decision.[4] A fairly large amount of experimental design has been addressed at explaining the source of choice reversal by the testing the existence of hyperbolic and quasi hyperbolic preferences. Although the capability of lab results in measuring and disentangling among those different drivers of choice reversal has been questioned[5], dynamic inconsistency is mainly traced back to the evaluation of time. However, choice reversals consisting in ex post deviations from the initial plans are not necessarily originated from a time inconsistent preference, as the interplay between emotional and cognitive biases can be traced back to many other motivations (Casari and Dragone, 2015). Choice reversal towards a lower/shorter-term pay-off has been explained also by preference for a commitment aimed at cancelling out uncertainty at

[2]We account for "reversal of preferences when a subject prefers $10 now rather than $12 in a day, but he prefers $12 in a year plus a day rather than 10$ in a year" (Behanabib et al., 2010).

[3] For a review of the explicative and predictive capability of the two competing theories (DU vs. HD) see Harrison et al. (2005).

[4] Camerer et al. (2005).

[5] In most of intertemporal choice experiments the elicited discount rates are substantially higher than the market interest rates, ranging from 40% to 200%" (Coller and Williams, 1999). Since such distant values do not sound plausible, Andreoni (2012) recently appointed that "experimentally elicited discount rates are frequently higher than what seems reasonable for economic decision making".

the cost of loss of flexibility in the future behaviour (Casari and Dragone, 2015). There are many hints in the literature pointing in this direction. Once the time interval is partitioned, two equal choices do differentiate due to the distribution of utility values. The average discount rate for the 24-month interval is lower than the compounded average discount rate over the three 8-month intervals and does not appear to decline across time (Read, 2001). An indifferent variation in the sequence of time intervals in which different pay-offs are presented can end up in hyperbolic discounting due to the attractive force of similar pay-offs. In experiments performed by Rubinstein (2003) subjects split in their preferences between the sequence of dates (April 1, July 1, October 1, December 1) with the sequence of payments ($1000, $1000, $1000, $1000) and the sequence (March 1, June 1, September 1, November 1) with the sequence of payments ($997, $997, $997, $997), but most of them prefer $997 on November 1 to $1000 on December 1. Our attempt in this paper is to broaden the range of possible explanations of choice reversal by presenting experimental evidence of reversal in intertemporal choice due to "anticipatory feelings"[6]. Just opposite to hyperbolic discounting, where the individual intertemporal choice is driven by impatience, we explore anticipatory feelings, heading to anticipation of a "bad" or procrastination of a "good". The level of arousal "as if the experience were already in place" (Scitovsky's (1976), p.78) clearly fastens to the notion of anticipatory feelings, which underlines "savouring" as the procrastination of consumption as the time of consumption approaches. Choice reversal in the direction of consumption postponement happens when a decision of consumption that had

[6] A revive of psychological motivations in intertemporal decision was Scitovsky's (1976) non-analytical appraisal of utility – to be intended as pleasure or pain - stemming from sentiments such as anticipatory feelings, novelty, arousal and boredom.

already been made is delayed up to the moment in which the increase in anxiety threats to endanger the increase in pleasure. The slower the rise in anxiety, the more anticipatory feelings are free to feed the savouring, and the longer the increase in pleasure can be procrastinated. The paper innovates with respect to the literature on intertemporal decision making in that the motivation for a varying discount rate heading to anticipation or procrastination has been elicited both with money and consumption *and* within a dynamic setting. Our main findings are:

- About 47% of the experimental subjects chose to postpone the consumption of goods. In addition, more than half (57%) of the subjects reversed their initial choices. With regard to the fact that the main motivation behind the discounted utility model is impatience and temptation, the experiment's outcomes suggest that this model is not able to fully explain intertemporal choices by the subjects.
- More than half (58%) of subjects who reversed their choices during the experiment exhibited at least one time anticipatory feelings. We conclude that anticipatory feeling might be a possible explanation behind the choice reversal.

The paper develops as follows: Section 2 reminds to the theoretical debate on choice reversal and anticipatory feelings; Section 3 reports the basic structure of our experiment; Section 4 analyses the results of the experiment. Finally, in Section 5 the main conclusions and their comparison with the existing literature are drawn.

2.2. Literature review and derivation of hypotheses

The discounted-utility model (DU) of individual intertemporal choice replicates in the dimension of time the axiomatic of rational

choice delivering the optimal aggregation of expected prospects. This standard model explains the choice between the present and future consumption as the once forever choice portrayed by the exponential utility function, where the value of the discount rate is constant across time. This analytical presentation nicely fits with the view of the agent of rational choice theory, whereby the abstinence from present consumption allows the accumulation of financial assets, which will be sold at the end of the working life in order to fund the consumption of the individual during his retirement. Insofar as the intertemporal choice is concerned, the approach centered on the hyper-rational agent has been challenged by overwhelming evidence showing that experimental subjects' choice over money or consumption may vary across time, so that the discount rate is variable. Let us compare the life-cycle utility function presenting the preferences of a subject living T periods at time $t = 0$:

$$V_0([C_t]_{t=0}^{T}) = u[C_0] + \beta \sum_{t=1}^{T} \delta^t u[C_t] \tag{2.1}$$

and at time $t = 1$:

$$V_0([C_t]_{t=0}^{T}) = u[C_0] + \beta \sum_{t=2}^{T} \delta^t u[C_t] \tag{2.2}$$

where $0 < \delta < 1$ and $0 < \beta < 1$. In the DU model the value of the discounting factor β stays constant at $\beta = 1$, so that the ordering of intertemporal consumption levels is invariant to the time of choice. However, if the values of the discount rate are in the range $0 < \beta < 1$, the solution to (2.1), which is valid for all $t \geq 1$, and the solution to (2.2), which is valid for all $t \geq 2$ may be different at different points in time. It is easy to show that this happens just because the value of βδ may change at each point in time. In equation 1, $u'(c_1^*)/u'(c_0^*) = \beta\delta$ and $u'(c_{t+1}^*)/u'(c_t^*) = \delta$ for any $t \geq 1$, while the second period's

solutions are $u'(c_2^\circ)/u'(c_1^\circ) = \beta\delta$ and $u'(c_{t+1}^\circ)/u'(c_t^\circ) = \delta$ for any $t \geq 2$. Hence, the lifetime consumption values decided in each period are different ($c_t^* \neq c_t^\circ$), and time consistency vanishes. The alternative to the exponential utility function of the DU model, which exhibits a constant discount rate, is the hyperbolic utility function of the HD model, which exhibits a varying but increasing discount rate, corresponding to the possibility at each point in time of choice reversal oriented towards the present[7]. These two appraisals of intertemporal choice bear on two motivations laying behind the value of β - abstinence and impatience, respectively[8].

The hypothesis of $\beta = 1$ strictly applies to the "consistent" agent of the DU model who makes a once-for-ever lifetime choice, implying a constant propensity to abstain from current-period consumption in favor of consumption in future periods. However, the hypothesis of $0 < \beta < 1$ admits choice reversal in both directions, that is anticipation and postponement. The non-constancy of the discount rate accommodates not only the view of the impatient agent exhibiting a "bias for the present", but opens to a varying value of the discount rate. Since the subject is in the position to revise at each date in the future his life-cycle plan of consumption, the value a subject may be willing to assign to his discounting is open to revision by modifying the value of $\beta\delta$, with utility alternating upswings and downswings over time. In important choices such as length of job search or early retirement, in which to rank the future against the

[7] For our aims, the difference between a hyperbolic function and a quasi-hyperbolic function (consisting of the summation of not necessarily hyperbolic functions, the aggregation of which approximates the hyperbolic function) can be waived.

[8] Abstinence corresponds to the commitment to be parsimonious in order to save with future needs, which motivates the view whereby the discount (interest) rate is the reward for abstaining from present consumption. The non-constancy of the discount rate has been interpreted as impatience (and impulsivity) with respect to prospective gains (Strotz, 1956).

present is a crucial decision at each stage of life, the individual's intertemporal decision may exhibit a rise or a reduction of the discount rate at any time. Being a rational decision by its very nature a forward-looking attitude, as time passes by any subject may need to revise the consumption plan according to Bayesian updating, and a new consumption profile is likely to emerge.[9]

Choice reversal

In the theoretical literature we can find a variety of interpretations of intertemporal choice, which go beyond the one-direction choice reversal towards the present. The evolution of the subject's intertemporal choice could then be conceived as Markovian strategies of a game between successive selves. The impact of a time delay on intertemporal preference may change, because different selves are in power at different instances of the life-time of the individual. The prevailing interpretation of choice reversal then points to a "bias for the present". Choice reversal towards a lower/shorter-term pay-off has been explained by preference for a commitment aimed at cancelling out uncertainty at the cost of loss of flexibility in the future behaviour (Casari and Dragone, 2015). As we said before, the prevailing interpretation of choice reversal points to a "bias for the present". The usual method experimentalists employ to elicit choice reversal is asking subjects some questions over their preference in a static setting at the same date. For instance[10], subjects are asked to make decision over two problems. The problems differ only in time horizon: receiving \$100 now and receiving \$100+ x tomorrow, and

[9] "Rather than simply maximizing preferences in a limitless fashion, people set goals for themselves, monitor their progress toward those goals, and adjust behavior when they fall short of their goals" (Camerer, Loewenstein, and Prelec,2005, n.13)
10 Rachlin and Green, 1972, Thaler, 1981, Frederick et al., 2002.

between receiving \$100 in t days and receiving \$100+x in $t+1$ days. If a subject selects \$100 now in the first decision and selects \$110 in the second one, choice reversal would be observed. In this example subjects make both decisions in a certain point of the time (t=0). But what might be more important is making decision over the time and explore if a preference would be constant by passing time or subject`s preference would be reverse after adopting new information. Imagine a student plan to study for an exam in four weeks. She has two different strategies: every day studies three hours per days or studies 6 hours per day only in last two weeks. Imagine she decide the second case. After passing two weeks, she might again change her plan in a sense that she postpones her studies to last week, 12 hours per day. In this example we noticed another type of choice reversal which is not static. The decisions were not made in a certain point of the time and the subject reverses her preference over the time. Casari and Dragone (2015) categorized choice reversal into three different types: Static, Dynamic, and Calendar. To illustrate the concept of each type, they consider two consumption goods: x and y and a subject who makes decisions over three different choices:

- Decision A: at date t, choose between consuming x at date t or y at date $t+1$.
- Decision B: at date t, choose between consuming x at date $t+1$ or y at date $t+2$
- Decision C: at date $t+1$, choose between consuming x at date $t+1$ or y at date $t+2$.

As we said above, static choice reversal points to a "bias for the present". It will be detected in Casari and Dragone (2015) framework, if the subject chooses x in A and y in B or y in A and x in B. Inconsistency in preference over the time is the central notion of static

choice reversal. It can be explained by different level of impatience over different horizons of time. In another word, when the subject has positive time preference for one horizon of the time and has a negative time preference for another horizon of the time we face a reversal over the choices. The subject makes decisions over A and B at the same time (t). But as we explained above for studying self-control problems we need to go beyond the specific point of the time. To this aim, we compare decision B and C.

Another form of choice reversal will be detected if the subject chooses x in B and y in C or y in B and x in C. Casari and Dragone (2015) called it Dynamic choice reversal. Dynamic choice reversal is much stronger notion than static one to explain many behaviors which are influenced by self-control problems and procrastination (e.g. study plan by student). Another type of choice reversal will be observed when the subject switches her preference by passing through the calendar. More precisely, if the subject chooses x in A and y in C or y in A and x in C then calendar choice reversal will be detected. It might occur when the subject changes her preference due to an unexpected event. In order to test the hypothesis of the origin of choice reversal in anticipatory feelings, we put forward two methodological strategies. First, we point to a deeper understanding of individual intertemporal choice by eliciting discount rates by testing both for money and consumption goods in the lab. Most intertemporal experiments ask subjects to make decisions over time-dated amounts of money. Thus, they elicit discount rates over stocks of money instead that individual discount rates over utility, and consequently impose to think in terms of stocks of money rather than in terms of the utility of consumption flows. However, whether choice reversal applies both to money and consumption, or the experimental evidence differentiates depending on what is at stake, is still unclear. Even in the case of simple linear

utility functions, discount rates over money do not necessarily elicit discount rates over consumption (Cubitt and Read, 2007). Furthermore, in some experiments the discount rate of intertemporal choice over money appears to be much less erratic than the one on consumption (Thaler, 1981).[11] In some others, discount rates with money and with a consumption good are highly correlated (Reuben et al., 2011). However, pleasures characterized by a similar risk of compulsivity such as food and sex, bring about different psychological rewards independently from the time of the choice: "The sight of food might lead to increased discounting for food but not for sex, while the sight of an attractive potential sexual partner might lead to increased discounting for sex but not for food" (Loewenstein and O'Donhogue, 2004, p.25). The problem is that in these experiments intertemporal choice has been elicited at an initial date for all subsequent periods. This still leave on the ground the question whether in the lab by choosing amounts of money at different dates subjects are in actual fact evaluating amounts of consumption goods at different dates, that could explain the very high interest rates induced by experimental setting. One reason why the question is far from being set, is that in these experiments intertemporal choice has been elicited at an initial date for all subsequent periods. This brings us to our other methodological point. Second, we innovate the experimental design by testing the individual intertemporal choice in real time. The typical experimental design aimed at eliciting individual time preferences

[11] For example, subjects have been asked to specify the amount of money they would require in [one month/one year/ten years] to make them indifferent to receiving $15 now. The median responses [$20/$50/$100] imply an average (annual) discount rate of 345 percent over a one-month horizon, 120 percent over a one-year horizon, and 19 percent over a ten-year horizon. Yet, Thaler (1981) also found that some people prefer "one apple today" to "two apples tomorrow" but at the same time they prefer "two apples in one year plus one day" to "one apple in one year".

requires that subjects go to the lab only once and the whole process of elicitation is completed in that occasion (typically with MPL), so the dynamic aspect of their decisions in some way could be missed out. This setting of time artificially passing through imposed by the lab lacks of realism. In fact, subjects face decisions and state preferences over time with the only feedback of time passing through in the incentive mechanism (that is the fact that they actually receive payment at the preferred stated date through a deposit in their current account). Moreover, this setting is potentially distorted. Bias effects could easily arise, depending on the individual bounded capability of distinguishing among different amounts of money at different future dates. This paper sits squarely in the cross road among different strands of literature since it is addressed to better understand if and how much the described anomalies in discounting occurring in the lab arise from a misperception of the actual rewards at stake (money versus consumption) or from the "artificial setting" imposed where time is not really passing through or from the existence of "anticipatory feelings" heading to anticipation of a "bad" or procrastination of a "good". To more rigorously test intertemporal choices, we implement a dynamic experimental setting in which the same sample of experimental subjects make intertemporal decisions in separate venue in the time corresponding to actual temporal decisions. Since this method permits both to elicit subjects plans and to track their implementation over time, a better understanding of time inconsistency should ensue.[12] Furthermore, this approach is complicated by testing also for satiation implications of consumption.

[12] Examples of a dynamic set up in intertemporal decisions are among the others: Della Vigna and Malmendier (2006), Charness and Gneezy (2009), Ariely and Wertenbroch (2002) and Giné et al. (2012). Carbone (2008) offered to experimental subjects' choices among alternative activities (physical exercise, reading a book, eating chocolate, etc.) and latter money allocations.

Anticipatory feelings

Once the hyperbolic discounting model (HD) was set up after systematic anomalies in intertemporal choice with respect to the discounted-utility model (DU) (Samuelson, 1937), dynamic inconsistency has been definitely traced back to the evaluation of time. Whatever the relevance of abstinence (as advocated by the DU model) or impatience (as advocated by the HD model) in intertemporal choice, other psychological factors, attributing different utility values to different gains and losses at different time, have been mostly overlooked. The dominant position assigned by the EUT to rational behaviour and to actual choices as "revealed preferences" has obscured the crucial role of which sensations and feelings were credited in the works by Adam Smith (1759) and David Hume (1739).[13] In this paper we explore the idea of anticipatory feelings, heading to anticipation of a "bad" or procrastination of a "good" in intertemporal decisions. The condition for anticipatory feelings complementing the rational deliberation not to behave impulsively, is a high degree of connectedness of the present self with his future selves within the "multiple-self" individual (Parfit, 1984). The higher is the degree of connectedness, the more the "deliberative brain" does not conflict but complements with the "emotional brain". The literature concerned with the impact of emotions on rational choice was revived by the Caplin and Leahry (2001) seminal paper aiming to take into account psychological states (such as excitement and hope) in expected utility theory under uncertainty. If the affective system

[13] Smith shared with Hume the same view on the motivation of decisions. "Pleasure and pain are the great objects of desire and aversion: but these are distinguished not by reason, but by immediate sense and feeling. If virtue, therefore, be desirable for its own sake, and if vice versa be, in the same manner, the object of aversion, it cannot be reason which originally distinguishes those different qualities, but immediate sense and feeling (A. Smith, 2009(1759), p. 377).

occupies the center of the stage any commitment to stationarity would be reneged on. In a heuristic paper, Loewenstein and O'Donoghue (2004) make the hypothesis that the affective system is ruling the roost, but the deliberative system is able to influence the affective system's preference by exerting costly cognitive effort (neural connections link the deliberative prefrontal cortex to the amygdala and other instinctive sections of the brain). Since the evaluation of future is not depleted in prompting impatience, the subject attaches value to his future wealth or consumption and does not suffer from, but enjoys, procrastination. The level of arousal "as if the experience were already in place" (Scitovsky's (1976), p.78) clearly fastens to the notion of "anticipatory feelings". The slower the rise in anxiety, the more anticipatory feelings are free to feed the savouring and the longer the increase in pleasure can be procrastinated. The concept of flow proposed by Csikszentmihalyi (1997) consists in performing an activity by being fully immerged in the feeling that is to the same degree far from excess anxiety and excess boredom. Csikszentmihalyi posits arousal and boredom on the opposite sides of a spectrum of mental states in correspondence with medium levels of challenge and skill, the same theoretical position affirmed by Scitovsky (1992).

Choice reversal in the direction of consumption postponement then happens when a decision of consumption that had already been made is delayed up to the moment in which the increase in anxiety threats to endanger the increase in pleasure. A recent attempt to resume psychological motivations – such as anticipatory feelings, novelty, arousal and boredom - is Scitovsky's (1976) non-analytical appraisal of utility stemming from pleasure or pain. The Scitovsky's analysis of novelty can be valuably used to justify choice reversal in intertemporal individual behaviour – but by postponing consumption, instead of its anticipation proposed by the HD model - as the effect of

the primary influence of the affective system on action. The dominance of emotion in Scitovsky's approach to human behavior is demonstrated by his view whereby any pre-commitment is rooted in the affective system. In the next section, we present a multi-stage experimental design inspired to the Scitovsky's analysis of arousal in terms of anticipatory feelings. The vast majority of the experimental studies on intertemporal choice have a static setting. The not negligible limit of this kind of experimental design is that the variation in time preference is just detected by way of choices at different dates but subjects choose at the initial date, so that the possibility of choice reversals in both directions is by definition ruled out. Eliciting intertemporal choices in a dynamic setting where subjects choose at multiple dates allows for a deeper understanding of choice reversals. The experimental protocol should be administered by means of an appropriate modelling of sessions to be performed at each date, so that preferences be elicited at distant time intervals to capture the evolution of time. Our experimental design tries to build up a setting in which both procrastination and anticipatory feelings were at work and could be in some way disentangled. We elicit the subject's time preference and then verify if at the definite time of consumption, the same choice is maintained, or postponed to a subsequent time. The hypothesis is that choice reversal towards the present as the decision time approaches occurs less frequently when the intertemporal choice regards a pleasant experience that is at a future date than when is located in the present. Anticipatory feelings concern the subject's disposition to imagine and savour, thus implying an attitude to postpone an experience of pleasure and anticipate an experience of pain. We assume that when facing a rewarding task to be completed under a deadline, some subjects could prefer postponing the stemming utility. Therefore, we focus our attention on eliciting intertemporal

preferences dealing with the desire to accrue money, or the waiting and savouring the pleasure of experiencing a "physical good".

2.3. The experimental design

The experimental set up

Our experimental design tries to build up a setting in which both procrastination and anticipatory feelings were at work and could be in some way disentangled. We assume that when facing a rewarding task to be completed under a deadline, some subjects could prefer postponing the stemming utility. This holds especially in a consumption framing where this behaviour could be explained by the desire to accrue, through waiting, the pleasure of experiencing a "physical good". Therefore, we focus our attention on eliciting intertemporal preferences with non-monetary rewards. Since the common practice among experimental economists is to use money as a reward we control our results checking for individual preferences over money rewards of the equivalent amount of the consumption good and with the same intertemporal horizon. To this aim, we run a pilot experiment in which we study intertemporal subject's plans over consumption and we check for their implementation over time in a dynamic setting. More in detail, we run three experimental sessions in three different dates at two week intervals respectively at date 1, 2 and 3. We recruited the same sample of subjects in the three different sessions over one-month period: exactly 61 subjects started off the experiment (one subject removed from the list due to some technical issue), of which only 58 accomplished the all the experimental task attending all three sessions. This design allows us to elicit individual decisions at multiple points in time in correspondence of real time

running and to check about the consistency between a plan and its implementation as time passes through. In each of the sessions our experimental subjects face the main decision task of ranking, on the basis of their preferences, when to consume a "cappuccino and croissant" good; in each session subjects were asked to express their preferences on when to consume a "cappuccino and croissant" in the following way: in Session 1 the available dates were 0 (today), 1 (two weeks later) and 2 (four week later); in session 2 the available dates were 0 (today), 1 (two weeks later); in session 3 just today was available (Table 2.1). Since there are three available choices in session 1 and two available choices in session 2, we would have six possible rankings in former session (Table 2.2) and two possible rankings in later one (Table 2.3).

Put in order of preference (1st, 2nd and 3rd) the following alternatives:
□ Consume "cappuccino and croissant" today (immediately at the end of the experiment here in the classroom) (1° or 2° or 3°);
□ Consume "cappuccino and croissant" in 15 days (here in the classroom) (1° or 2° or 3°);
□ Consume "cappuccino and croissant" in 30 days (here in the classroom) (1° or 2° or 3°).

Table 2.1 - Available dates for consuming good in session 1

In order to be sure that the ranking among the different times of consumption are not affected by the time (morning) in which the experiment was run and by the fact that our subjects' choices could be affected by the occurrence that they have made or not breakfast before the experiment, in each sessions we randomly select (as a control for "satiation") a group of 15 subjects that consumed a "cappuccino and croissant" before the experiment. Since the behaviour of those control groups not significantly differ from that the others participating to the same session we assume that this occurrence did not affect their

ranking. Since we are especially concerned about the possibility that anticipatory feelings affect the "consumptions of a good", at the end of each session we gave to the subsample of experimental subjects that assessed to prefer to consume "today" their "cappuccino and croissant" (immediately at the end of the experiment in the room where the experiment was run) the possibility to postpone it by a day (Figure 2.1). This procedure adopted allows us also to control if these potential anticipatory feelings could be affected by the running of the time and by end of period effects.

Ranking	*Most preferred date*	*Intermediate preference*	*Least preferred date*	*Number*	*Percentage*
012	Today	Two weeks later	Four weeks later	26	43%
120	Two weeks later	Four weeks later	Today	13	22%
102	Two weeks later	Today	Four weeks later	7	12%
210	Four weeks later	Two weeks later	Today	7	12%
021	Today	Four weeks later	Two weeks later	6	10%
201	Four weeks later	Today	Two weeks later	1	2%
Total				60	100%

Table 2.2 - Ranking of preferred dates for good consumption in session 1

Ranking	*Most preferred date*	*Least preferred date*	*Number*	*Percentage*
12	Today	Two weeks later	39	67%
21	Two weeks later	Today	19	33%
Total			58	100%

Table 2.3 - Ranking of preferred dates for good consumption in session 2

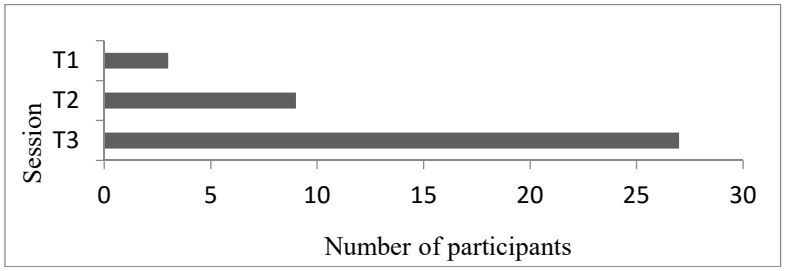

Figure 2.1 - Number of participants who prefer waiting for an additional day (Anticipatory Feelings)

Sample and procedures

Our experimental sample is composed by 58 undergraduate students of the first year of Economics at Luiss University of Rome of which 35 males and 23 females. Most of them come from the Centre of Italy (40 out of 58) and the remaining from the South (18 out of 58). Our experimental sessions were all conducted in Aula Polivalente of Luiss Guido Carli University of Rome so that the logistic would be minimized. In order to better understand how individual' characteristics could affect the possible existence of *anticipatory feelings* we elicit separately both individuals' risk attitudes and intertemporal preferences. To do so, we adopted two well stated elicitation methods: respectively the Holt and Laury (2002) elicitation procedure for risk attitudes and the Andersen, Harrison, Lau and Rutstrom (2014) elicitation procedure for intertemporal preferences over money for the same periods we ask subjects to state their preferences over consumption.

Controls: risk attitudes and individual discount rates

In order to measuring risk aversion, Holt and Laury (2002) derived a multiple price list (MPL) design. In this framework, risk attitudes were evaluated by asking subjects to make a series of choices

(10 choices) over outcomes that involve some uncertainty: in particular, they asked subjects to make a choice between a riskless and a riskier lottery as reported in Table 2.4. The first row exhibits that the expected payoff for lottery A is much larger than ones for lottery B. By proceeding down the matrix, the expected payoff for lottery B has gown greater than expected payoff for lottery A, although both lotteries have been increased. Obviously, the expected payoffs for options A and B were not presented for subjects. Each subject chooses option A or B in each row and at the end of experiment we randomly select one row for payout for each subject. Holt and Laury (2002) claim that only risk lover subjects would choose lottery B in the first row and only risk averse subjects would choose lottery A in the ninth choice. They called subjects risk neutral if they switch from option A to option B in the fifth choice (since the expected payoff for option A is larger than option B in the first four rows and it changes after choice 5). The last row just tests if the subjects understand the concepts[14]. Figure 2.2 shows the distribution of switching points in each session[15].

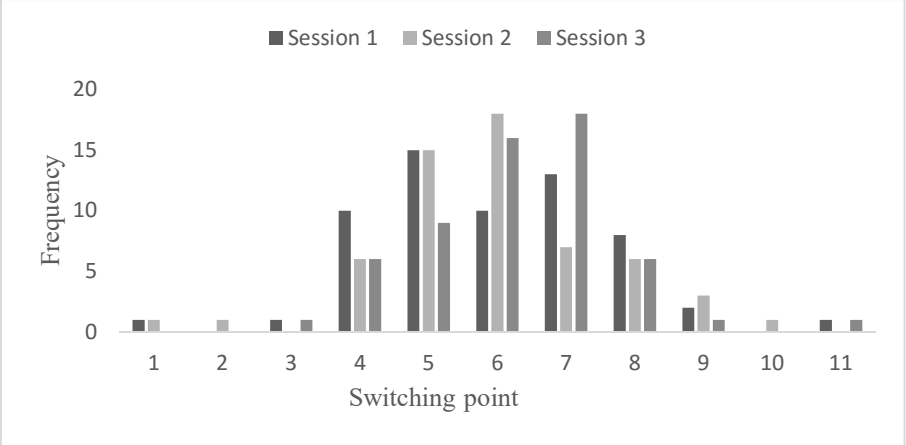

Figure 2.2 - Distribution of switching points in risk aversion lotteries

[14] It happened only for one subject at session 2.

[15] Switching point 11 means a subject choose lottery A in all the choices. It actually happened only once at session 1 and once at session 3.

Choices	Option A				Option B				Expected payoff		CRRA Interval if Subject Switches to B
	Prob	Payoff	Prob	Payoff	Prob	Payoff	Prob	Payoff	EV(A)	EV(B)	
1	0.1	2.00	0.9	1.60	0.1	3.85	0.9	0.10	1,64	0,48	(-∞, -1.71)
2	0.2	2.00	0.8	1.60	0.2	3.85	0.8	0.10	1,68	0,85	(-1.71, -0.95)
3	0.3	2.00	0.7	1.60	0.3	3.85	0.7	0.10	1,72	1,23	(-0.95, -0.49)
4	0.4	2.00	0.6	1.60	0.4	3.85	0.6	0.10	1,76	1,6	(-0.49, -0.15)
5	0.5	2.00	0.5	1.60	0.5	3.85	0.5	0.10	1,8	1,98	(-0.15, 0.14)
6	0.6	2.00	0.4	1.60	0.6	3.85	0.4	0.10	1,84	2,35	(0.14, 0.41)
7	0.7	2.00	0.3	1.60	0.7	3.85	0.3	0.10	1,88	2,73	(0.41, 0.68)
8	0.8	2.00	0.2	1.60	0.8	3.85	0.2	0.10	1,92	3,1	(0.68, 0.97)
9	0.9	2.00	0.1	1.60	0.9	3.85	0.1	0.10	1,96	3,48	(0.97, 1.37)
10	1.0	2.00	0.0	1.60	1.0	3.85	0.0	0.10	2	3,85	(1.37, +∞)

Table 2.4 – Risk attitudes

The next question is that how we can interpret the switching points. The first method is simply assigning a binary value to each subject at each session. A subject is risk averse if she switches from lottery A to lottery B in one of the following choices: 1, 2, 3, 4, 5; and is risk lover if she switches from lottery A to lottery B in one of the following choices: 6, 7, 8, 9. The second method is assigning a scaler value between 0 and 10 to each subject by looking at the switching point. The third method employs the constant relative risk aversion (CRRA) characterization to assign an interval to each switching point. Holt and Laury (2002) calculate the implied bounds on the CRRA coefficient. In their model, CRRA interval is the dependent variable (Last column of Table 2.4). Thus, for instance, if a subject switch from A to B at choice 5, her CRRA interval would be between -0.15 and 0.14. In this study, we employed Holt and Laury (2002) design by assigning midpoint of each row CRRA interval to related switching

point for each subject (inverse distribution functions of switching points for each session are reported in Figure B.2, Appendix B). In order to elicit individual discount rates over money we employed the experimental designed was first introduced by Coller and Williams (1999) and then expanded by Harrison et al. (2002). In this framework, subjects are asked to make a series of choices (20 choices) over two certain outcomes that differ in terms of time they will be received (Table 2.5). This methodology permits to identify the individual discount rate function varying the time horizon; in particular, we consider the time horizons corresponding to our consumption setting (in our experimental setting, in 1 day, in 15 days, in 16 days, in 30 days and in 31 days). The annual rates adopted are respectively: 3,00%, 5,00%, 7,00%, 10,00%, 12,50%, 15,00%, 17,50%, 20,00%, 25,00%, 30,00%, 35,00%, 40,00%, 50,00%, 75,00%, 100,00%, 125,00%, 150,00%, 175,00%, 200,00%, 250,00% (distribution function and inverse distribution functions of switching points for each session are presented in Figures B.3 to B.7 in Appendix B). Figure 2.3 shows the distribution of switching points in each session.

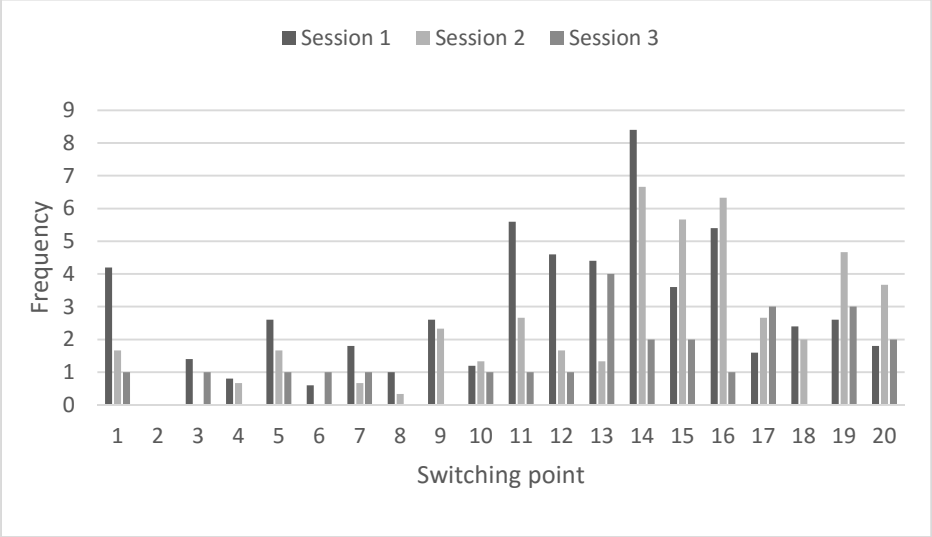

Figure 2.3 - Distribution of switching points in time discounting choices

Payoff alternative	*Payment option A (pays amount below today)*	*Payment option B (pays amount below tomorrow)*	*Annual interest rate (in percent)*	*Preferred payment option (circle A or B)*
1	200.00	200.49	3	A - B
2	200.00	200.82	5	A - B
3	200.00	201.15	7	A - B
4	200.00	201.65	10	A - B
5	200.00	202.07	12.5	A - B
6	200.00	202.48	15	A - B
7	200.00	202.90	17.5	A - B
8	200.00	203.31	20	A - B
9	200.00	204.15	25	A - B
10	200.00	204.99	30	A - B
11	200.00	205.83	35	A - B
12	200.00	206.68	40	A - B
13	200.00	208.38	50	A - B
14	200.00	212.70	75	A - B
15	200.00	217.11	100	A - B
16	200.00	221.60	125	A - B
17	200.00	226.18	150	A - B
18	200.00	230.86	175	A - B
19	200.00	235.63	200	A - B
20	200.00	245.45	250	A - B

Table 2.5 - Payoff table of the 1-day horizon

The first question is: do you prefer \$200 today or \$200+x in a certain horizon of time? If the subject prefers the \$200 today, then we conclude that her discount rate is greater than x% per day; otherwise, she has discount rate smaller than x% per day. By increasing x gradually in the next 19 questions we will be able to elicit discount rate more precisely. Let's look at changing point: If a subject takes the option A in choices 0 to 5, and takes the option B in choices 6 to 20, thus we conclude that her discount rate is between 12.5% and 15%. For any given individual the discount rate is not explicitly observed. We just know the interval the discount rate belongs to. To overcome this problem, both Coller and Williams (1999) and Harrison et al.

(2002) used interval censored methods. In this study, we take the midpoint of interval as a scaler value for related switching point. Table 2.6, shows the mean of discount rates corresponding to each time horizon for each session. As we can see, this number is relatively higher for day1 comparing to other time horizons in all sessions. The results are relevant to hyperbolic discount model. The mean of discount rate for all the subjects in each session are 82%, 139%, and 203% for session 1, 2, and 3 respectively (Table 2.6).[16]

	1-day	*15-day*	*16-day*	*30-day*	*31-day*	*Mean*
Session 1	115	67	72	75	81	82
Session 2	178	122	115			139
Session 3	203					203
All sessions						141

Table 2.6 - Mean of discount rate (in percentage)

Incentives and payments

We incentivized our subjects at the end of the experiment separately for each of the three task they performed during the experimental session. In particular, as far as risk attitude, we randomly select one choice among those proposed and we allow each of them to extract the corresponding payment from an urn accordingly prepared; for intertemporal rates we randomly select one of the time horizons proposed and then one out of the 20 choices and we pay them the outcome corresponding to their actual choice (in experimental tokens). As far as consumption, we give them the possibility to consume their

[16] In another attempt, we assigned a binary value for each decision: if a subject switch from option A to option B before choice 15 (when the annual discount rate is less than 100%) this subject is called impatient in this decision making, otherwise the subject is patient. We elicited this binary value for each subject for each session in all horizons of time. Figure B.1 in Appendix B shows the percentage of impatient subject in any decision making. In addition, the tables report the results in more detail when we divided the subjects into 2 different categories: Men/Women and Risk averse/Risk lovers.

“croissant e cappuccino” at the preferred date. Our subjects gain from the experiment an average of 8 euro per session (3 in good and 5 in money), getting an overall payment of about 24 euro a subject.

2.4. Results

In the following section we discuss our results in-depth. First, we present the preferred profiles for good consumption and then examine how subjects’ preferences might revers during the experiment. Finally, we explore the causes of choice reversal by concentrating on the role of anticipatory feelings. Our experiment contains three sessions in three different dates at two week intervals respectively at date 1, 2 and 3. We recruited the same sample of subjects in the three different sessions over one-month period. The dynamic design of the experiment allows us to elicit individual decisions at multiple points in time in correspondence of real time running and to check the consistency between a plan and its implementation as time passes through.

Preferred profiles for good consuming

In session 1, about half (47%) of the experimental subjects chose to postpone consumption good (cappuccino and croissant) to the future sessions (34% to session 2 and 14% to session 3). This results are in contrast to the primary assumption which notes that subjects would prefer immediate pleasure rather than later one (note that we assume that subjects receive pleasure by consuming the good). Clearly, the results cannot be explained by theoretical discounting utility functions (either exponential or quasi hyperbolic discounting models). According to discounting utility functions the best choice for a subject is preferring the closer future rather than further future (i.e.

012 rather than the other choices). The results presented in Table 2.2 reveal that only 43% of subjects chose this profile. By comparing the preferred profile between today and in four weeks (Table 2.7), we noticed that although 55% of subjects preferred to consume immediately (012 and 021), 13% of them preferred to consume in four weeks (201 and 210). Moreover, 68% of the subjects' preferences are compatible with a stochastic utility model (210 and 201 and 012 and 102). By comparing the preferred profile between in two weeks and in four weeks, however, we noticed that 24% of the subjects preferred to consume in four weeks (201 and 210 and 021) rather than in two weeks (120 and 102 and 012). As a consequence, discounted utility model seems not a sufficient model for explaining the subjects' intertemporal choices. It only explains 43% of the subjects' preferences in our experiment.

	Most preferred date	*Intermediate*	*Least preferred*	
Today	55%	13%	32%	100%
In two weeks	32%	55%	13%	100%
In four weeks	13%	32%	55%	100%

Table 2.7 - Preferred dates chosen by subjects

Choice reversal

In the experiment 57% of subjects show at least one type of choice reversal. Casari and Dragone (2015) discuss that when one type of choice reversal is observed by a subject it is sufficient to detect another type of choice reversal. For instance, if a static choice reversal is detected by a subject, we would expect either dynamic or calendar choice reversal too. Moreover, they show that it is not possible to detect all types of choice reversal simultaneously. Hence, for each subject we will expect to detect either no any type of choice reversal

or two types. In our experiment, 43% of subjects did not exhibit any form of choice reversal. They either chose profile 012 in session 1 and 12 in session 2, or chose profile 210 in session 1 and 21 in session 2. The preference of former group is possible to be explained by discounting utility function. They do not show any form of procrastination and, thus, closer gratification is the most preferred date for this group rather than further gratification. In addition, we detect another group of subject (later group) who also did not exhibit any form of choice reversal, however, their preference over consumption good is totally in an opposite direction of the former one. They exhibit a negative time preference utility function and always prefer further gratification. Only 7% of the subjects had this preferred profile.

	N	*Percent*
Static choice reversal (T1)	27	47%
Calendar choice reversal (T1 and T2)	21	36%
Dynamic choice reversal (T2 and T3)	18	31%
Subjects show at least one form of choice reversal	33	57%
Subjects show no any form of choice reversal	25	43%
Sum	58	100%

Table 2.8 - Different forms of choice reversal

Table 2.8 reports that about 47% of participants exhibit static choice reversal. As we said above this reversal of choice points to a bias for the present. In the experiment, static choice reversal is detected when a subject show any kind of inconsistency over preference in session 1 (preferred profiles 021, 201, 120, 102). Moreover, about 36% of subjects exhibits calendar choice reversal. As we said in section 2.2, this type of choice reversal will be detected when a subject switches its preference by passing through the calendar. In our setting, if a subject switches its preferred profile by

passing from session 1 to session 2 we will observe the occurrence of calendar choice reversal. In addition, we observed that about 31% of subjects exhibit dynamic choice reversal which it mostly points to self-control problems and procrastination. Table 2.9 (according to Casari and Dragone (2015)) reports under which scenario each type of choice reversal might happen. In conclusion, contrary to our hypotheses, 57% of subjects show at least one form of choice reversal. The question is how to explain this occurrence.

Preference in session 1	*Preference in session 2*	*Static Choice Reversal*	*Dynamic Choice Reversal*	*Calendar Choice Reversal*	*Number of subjects*	*Percentage of subjects*
0,1,2	1,2	No	No	No	21	36%
0,1,2	2,1	No	Yes	Yes	3	5%
0,2,1	1,2	Yes	No	Yes	4	7%
0,2,1	2,1	Yes	Yes	No	2	3%
1,0,2	1,2	Yes	Yes	No	5	9%
1,0,2	2,1	Yes	No	Yes	2	3%
1,2,0	1,2	Yes	Yes	No	5	9%
1,2,0	2,1	Yes	No	Yes	8	14%
2,0,1	1,2	Yes	No	Yes	1	2%
2,0,1	2,1	Yes	Yes	No	0	0%
2,1,0	1,2	No	Yes	Yes	3	5%
2,1,0	2,1	No	No	No	4	7%

Table 2.9 - Frequency of preferred profiles

In section 2.2 we discussed that although many experimental design has been addressed at explaining the source of choice reversal by the testing the existence of hyperbolic and quasi hyperbolic preferences, however, choice reversals consisting in ex post deviations from the initial plans are not necessarily originated from a time inconsistent preference, as the interplay between emotional and cognitive biases can be traced back to many other motivations. Anticipatory feelings may be a possible explanation of reversal in

intertemporal choice. It happens when a subject receive savoring while waiting for a future award (in our experiment: consumption good) or try to reduce the rise of anxiety while anticipating a bad event. In the next section we will investigate how anticipatory feelings explain the reversal of choices.

Role of anticipatory feelings

As we explained in section 2.3, at the end of each session we gave to the experimental subjects that assessed to prefer to consume "today" their "cappuccino and croissant" (immediately at the end of the experiment in the room where the experiment was run) the possibility to postpone it by a day. We put this feature in the experiment because we are concerned about the possibility that anticipatory feelings affect the "consumptions of a good". In order to isolate the effect of anticipatory feelings on postponing the reward, subjects were insured that they would receive the primary reward without any uncertainty. The results reveal that 52% of subjects preferred to postpone consumption of the good at least in one session. However, what more important is that 58% of subjects who exhibited one type of choice reversal showed at least one time anticipatory feelings. This suggests that anticipatory feelings (in this case postponing the savoring) can be a possible explanation behind reversing the choices (obviously, is not the only one). To better understanding how and in which extend choice reversal is influenced by anticipatory feelings we use some regression analyses. Table 2.10 illustrates the results of a probit regression to explain reversal in preferences. In this model, the dependent variable is a binary variable equals 1 if an individual show at least one form of choice reversal; and equals zero, otherwise. The main explanatory variable is anticipatory

feeling. We have data from 58 subjects at each session, thus, we would have 174 observations for anticipatory feeling (AF) in our panel data model. AF_t equals 1 when a subject prefers to postpone the primary reward to one day later (exhibits anticipatory feeling) in session t ($t = 1, 2, and\ 3$). The Model 1 reveals a positive and significant correlation between choice reversal and anticipatory feeling. It confirms our hypotheses which says that anticipatory feeling is partially able to explain reversal in preferences. Obviously, this correlation does not show much if we do not consider other factors might affect the choice reversal. To overcome this concern, we add control variables to the initial model. Since for each subject we elicited discount rate and risk aversion in each session, we used their individual characteristic as control variables. We remind that to elicit discount rate, we submit subjects a series of choices (20 choices) over two certain outcomes that differ in terms of the time: 5 time horizons in session 1, 3 time horizons in session 2, and 1 time horizon in session 3. In our panel, we have to dedicate one number to each subject at each session. To this aim, we measure the mean of discount rates in different time horizons for each session. Therefore, for instance, the dedicated discount rate for session 1 is the average of 5 number correspond to 5 time horizons discount rate (i.e. 1day, 15day, 16day, 30day, and 31day). Model 2 shows the regression outcome when we add discount rate to the model. The regression coefficient of anticipatory feeling remains statistically significant although only at the 1% level. The regression coefficient of discount rate reveals a negative and statistically significant correspondence between discount rate and choice reversal. According to this results, the subjects who discount the time in a higher rate (more impatient people) they more likely reverse their choices. The results confirm the previous findings in the literature.

Dependent Variable: equals 1 if an individual show at least one form of choice reversal; and equals zero, otherwise.

Model	*(1)*	*(2)*	*(3)*	*(4)*
Anticipatory feelings	.418**	.444*	.384	.497**
(A dummy for each session)	(.236)	(.239)	(.237)	(.246)
Mean Discount Rate		-.002**		-.002**
		(.0009)		(.001)
Risk Aversion			.072	.036
(A dummy for each session)			(.200)	(.212)
Satiation				.326
				(.239)
Gender				.245
				(.207)
Region				.267
				(.213)
Constant	.083	.376**	.087	.363
	(.108)	(.171)	(.131)	(.239)
N	174	174	171	171
Pseudo R^2	0.0135	0.0341	0.0123	0.0515
Log likelihood	-117.347	-114.890	-114.956	-110.388

Notes: *Probit* estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 2.10 - probit regression outcome

Model 3 shows the results of regression after controlling for risk aversion variable (RA). For each experimental subject, RA_t equals 1 for risk lovers/risk ones and equals 0 for risk averse ones in session t ($t = 1, 2, and\ 3$). As we can see, the coefficient is not anymore statistically significant neither for anticipatory feeling nor for risk

aversion. We conclude that, in our experiment, the choice reversal is not influenced by the level of risk aversion.[17]

Finally, in Model 4 we add some other control variables: satiation, gender, and the place of birth. The purpose of adding "satiation" variable to the model is to insure that the ranking among the different times of consumption are not affected by the time (morning) in which the experiment was run and by the fact that our subjects' choices could be affected by the occurrence that they have made or not breakfast before the experiment. To this aim, in each session we randomly select a group of 15 subjects that consumed a "cappuccino and croissant" before the experiment. The results in Model 4 show that none of the new variables affect our primary results; anticipatory feeling still remains significant to explain the choice reversal.

2.5. Conclusion

Our attempt in this paper was to broaden the range of possible explanations of choice reversal by presenting experimental evidence of reversal in intertemporal choice due to "anticipatory feelings". Choice reversal in the direction of consumption postponement happens when a decision of consumption that had already been made is delayed up to the moment in which the increase in anxiety threats to endanger the increase in pleasure. We assume that consumption goods (in our experiment cappuccino and croissant) is a pleasant experience, however, about half (47%) of the experimental subjects chose to postpone it to the future sessions (34% postpone it in two weeks and

[17] As we described in session 2.3, in order to interpret the switching points, we can also employ the constant relative risk aversion (CRRA) characterization to assign an interval to each switching point (Holt and Laury (2002)). We used the same method and replace the binary variables by scaler ones and ran the same regression models. The results (presented in Table B.1) confirm our primary outcomes.

13% postpone it in four weeks). Moreover, we found that about 24% of subjects preferred to consume in four weeks (201 and 210 and 021) rather than in two weeks (120 and 102 and 012). Obviously, these results cannot be explained by standard discounted utility model as the only driver of intertemporal choices. The dynamic design of the experiment allows us to go deeply through reversal of choices by subjects. More particularly, we not only obtain static choice reversal, also we yield two other form of it over multiple points of the time (dynamic and calendar choice reversal). Therefore, we found that about 57% of subjects exhibited at least one form of choice reversal (47% static, 36% calendar, and 31% dynamics choice reversal). The results suggest that we should consider some other motivation than impatience and temptation to explain the reversal of choice. To do so, we derive the anticipatory feeling for each subject by dedicating a feature in our experiment design. The experiment`s outcome reveals that about 52% of subjects show at least one time anticipatory feelings and more interestingly, 58% of subjects who had choice reversal exhibits at least one time anticipatory feelings. We conclude that anticipatory feeling might be a possible explanation behind the choice reversal. In order to better understand how individual' characteristics could affect the possible existence of anticipatory feelings we elicit separately both individuals' risk attitudes and intertemporal preferences. To do so, we adopted two well stated elicitation methods: respectively the Holt and Laury (2002) elicitation procedure for risk attitudes and the Harrison et al. (2002) elicitation procedure for intertemporal preferences over money for the same periods we ask subjects to state their preferences over consumption. By adding these variables to the model, we noticed that although discount rate over money is a strong explanation for reversal of preference among the

subjects, it does not hurt the significantly of our finding about the influence of anticipatory feeling on choice reversal.

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Chapter 3

Happy Savers and Happy Spenders: An experimental study comparing US Americans and Germans[18]

Keywords: *Household finance; Spending behavior; Saving behavior; Economics of happiness; Cultural finance.*

3.1. Introduction

The question whether money makes people happy or not is the focus of philosophical speculation and abundant stories since ancient times and an obvious source for research questions. In this study, we approach this relation by concentrating on two functions of money (saving and spending) and explore how happiness is affected by any of them. Moreover, we compare participants from two different countries (Germany and the USA) with a similar level of wealth and development and explore how cultural differences may affect the individual`s behavior regarding money and happiness. We collect data from a computer based experiment which was completed by a total of N=105 participants. With a set of standard questions, we measure the participants` risk aversion, time preference, competitiveness and their desire to save or spend money. We try to answer two main questions: First, how do behavioral attitudes (such as need for saving, risk aversion, loss aversion, and time discounting) affect the experimental outcome, regarding actual saving and the happiness induced by saving? Second, are there any significant differences between

[18] This chapter is co-authored with Marc Oliver Rieger, University of Trier, and Thomas Dudek, University of Trier.

participants from Americans and Germans in how saving or spending affect happiness? We also explore thinking about how social status affects happiness and how this differs between Americans and Germans. Our main findings are:

- German self-classified savers who save and American self-classified spenders who spend are happier.
- People receive happiness not only from absolute wealth, but also from relative wealth in comparison to others.
- Relative wealth (social rank) is significantly more important to Americans than to Germans.

In the next section we review the related literature on definitions, measurements, and causes of happiness. We give a quick review on theoretical and empirical works related to money and happiness and their differences in intercultural studies. Finally, we derive our main hypotheses. In Section 3.3 we introduce our experimental design. The methodology which we have used to evaluate the data is described in Section 3.4. We present the main results in Section 3.5. In Section 3.6 we briefly discuss limitations in this study and, in Section 3.7 we conclude our work.

3.2. Literature review and derivation of hypotheses

Definition and measurement of happiness

Happiness is a subjective feeling and any individual understands it in his own way. Besides, any individual considers happiness in specific circumstances of which some are controllable and some are not (Diener, 2000). As a result, it is hard to measure happiness numerically. Nevertheless, many scientists have tried to measure the happiness, or what they prefer to call: subjective well-being. Stutzer and Frey (2012) categorize them into two main approaches: The first

approach, applied mostly by psychologists, is the Experience Sampling Method (ESM). In this approach individuals report their actual experiences in real time (e.g. Stone et al., 1999). Another approach is the Day Reconstruction Method (DRM). The main difference of this method to ESM is the timing of the report. In this method, in contrast to ESM, people report their previous day feeling (Kahneman et al., 2004). As Stutzer and Frey (2012) said, "the DRM aims to establish a cardinal indicator of well-being, by considering the time spent in a predominantly negative affective state". Both approaches are subjective and are constructed on individual self-reporting in questionnaires and surveys. Kahneman and Krueger (2006) and Helliwell and Barrington-Leigh (2010) discussed in more details about the different methods to measuring subjective well-being. Measurements based on the subjective concept are easy to perform, cheaper, and take relevant cognitive processes into account, which is why the present paper operates with this method. Therefore, in order to measure happiness in this study, participants are asked to select a happiness level on a scale from one to ten.

Determinants of subjective well-being

There are many difficulties in detecting determinants of happiness. It is, e.g., difficult to prove causality: does having a job make people happy or happy people are more likely to be employed? Moreover, unobserved individual-specific characteristic is another concern in front of researchers in this field (Stutzer and Frey, 2012). Similar problems arise when we are working with cross-country data. Apart from the individual characteristic, country fixed effects and the definition of subjective well-being may differ from one country to another. Ranking between different determinants also is a challenge. Although there is no doubt about the negative relationship between

health and happiness, we do not know whether a healthy, but unemployed person, is happier or an unhealthy person who does not have a job. Despite this kind of problems, some determinants of happiness have been found in the literature. One of the main determinants of happiness are personal and demographic circumstances (Diener et al., 1999). Many studies show positive relationships between the health situation and happiness (e.g. Oswald and Powdthavee, 2008). A relationship also has been found between happiness and marital status. Apart from the strong correlation, it is hard to explain the casual direction. Unobserved third variables also affect both parameters. Another substantial factor in subjective well-being is the institutional environment, such as security, justice, level of corruption and rules of law (Frey and Stutzer, 2000). People in societies with better institutions are more likely to being happy than people who live in a bad institutional situation. McBride (2010) studied the effect of social capital on happiness. Having the better relationship with family, friends, work mates and spouse has remarkable influence on happiness (e.g. Helliwell and Putnam, 2004 and Powdthavee, 2008). Finally, and important for economists, is the relationship between economics factors and happiness. Easterlin (2001) found that unemployment is related to lower subjective well-being, but what is the precise relation between income and happiness?

Income and happiness

While the idea that wealth increases happiness is very natural and also supported by recent studies (e.g., Stevenson and Wolfers, 2013 and Veenhoven and Vergunst 2013), it is uncontroversial. Probably one of the most famous critique to this idea goes back to Easterlin (1974). His data suggested that money does not lead to more happiness as soon as the basic needs are covered. The debate is still

continuing which underlines that the relationship between money and human well-being is complex and leaves many questions open. Comparison theory is one possible way to explain the Easterlin`s critique. Comparison theory states that individual subjective well-being is relative and it is mostly dependent on comparison between people in a society and is not necessarily dependent on economic growth or changing the standard living conditions (e.g. Easterlin, 1974 and Brickman et al., 1978). This is also compatible with newer theories on other regarding references (e.g., Di Tella et al., 2003 and Cohn et al. 2011). That is why in order to understanding better the influence of money on happiness we have to explore different aspects of money. In particular, we will focus on two crucial functions: Is it that spending money leads to more happiness or safety resulting from saving it? There are some studies related to happiness and the way individuals save/spend their money (e.g. Muffels et al. 2004). In this study, we construct our experiment based on the above theories. First by using a proxy for social status, i.e. using high score displayed (more details in Section 3.3), we explore the role of Comparison Theory on happiness. Second, by defining two main functions of money (saving and spending), we determine the level of happiness regarding to individuals' preferences in using their money.

Cultural differences

Intercultural comparisons between people from different countries are another interesting topic related to happiness. Many of the studies we mentioned above compare happiness across countries. Most of the studies agree that people from countries with better political and economic conditions, generally speaking, are happier than people from poor countries. These include variables such as real GDP per person, health, life expectancy, corruption levels and social

freedom. The question is that why the average level of happiness might differ between two countries with the same socio-economic structure: What is the role of culture on happiness? Lu and Gilmour (2004) summarize that "Members of different cultures may hold diverse views of happiness, covering definitions, nature, meaning and ways to strive for subjective well-being." The next question is what we mean by culture. If we agree that culture is a set of values, rules, beliefs, which is common among a group of people, there are still two considerations in this definition when we study intercultural differences. First, do people of the same nationality have the same culture? In other words, is there a homology between nationality and culture? Obviously not! Although there are many similarities, it is hard to say the entire Americans have the same culture. Nevertheless, studying data on country level can provide valuable first insights on cultural differences. The second consideration is which aspect of culture is important for us. There are studies trying to divide the concept of culture into different categories. Hofstede (1991), for instance, categorizes culture by some indices such as Power distance index, Individualism-Collectiveness, Long term orientation, Masculinity versus Femininity, and so on.

Therefore, in order to study intercultural differences in general, and cross cultural studies of happiness in particular, we should be very careful in measuring and interpreting differences of happiness. There are not so many empirical studies related to this topic. We review some of them here. Chiasson et al. (1996) explored happiness in four cultural groups. In their study, there were 215 students from Canada (both French- and English-speakers), the USA, and El Salvador. They found that some factors like family relationships, friendship, achieving valued goals have the most effect on happiness for all the participants. However, there are some differences such as religious values and

sociopolitical conditions which affect the happiness of people from El Salvador more. On the other hand, for people from North America, more individual aspects of life such as hedonistic experiences and personal sources of power have more substantial effects on happiness. In another study, Lu and Gilmour (2004) compared happiness between Chinese (142 students) and Americans (97 students). They found that material achievement, as well as personal responsibility and positive self-evaluations are key points for Americans to be happy. However, what is more important for Chinese is not only individual achievement, but also maintaining a harmonious equilibrium within the group. And finally, there is a study by Galati et al. (2006) who compared the level of happiness between 133 students from Cuba and 132 students from Italy; two countries with very different cultural and socio-economic structures. They found some common determinants of happiness between them such as health, family, love and money. The differences arise in their ranking and the degree of attainment of them. In this study, we also focus on cultural differences and its role on happiness induced by different functions of money. We choose two countries with more or less the same economic situations (Germany and USA) which are, however, different in some cultural aspects.

Hypotheses

The following hypotheses are based on the effect of individuals' personal characteristics on both their actual saving and their happiness induced by saving. Moreover, we are introducing some other hypotheses extracted from intercultural comparison between Germany and the USA.

Actual saving

In a first step we are interested to check how participants` actual savings are relevant to their self-classification. Fünfgeld and Wang (2009) defined a self-clarification scale for the need to save and the desire to spend and found that people by and large act according to their self-classification. We are interested to know whether or not we can find the same result in our experiment. Moreover, we are going to explore differences in participants` actual saving to the level of risk aversion, time discounting, loss aversion etc. Therefore, we are suggesting following hypotheses:

H1: Self classification:

a) Self-classified savers tend to save more.
b) Self-classified spenders tend to spend more.

Actual saving and happiness

People are different also in how they enjoy their lifes and how they want to spend their money. Although some people prefer to save their money and it makes them happy, others may receive pleasure by spending more, no matter what is going on in the future. In this second step, we focus on the relationship between money and happiness with following hypotheses, we are going to know what will happen on individuals` happiness when they spend or save their money. Moreover, we are interested to know how the level of happiness is changing among individuals depending on different personal characteristics. For instance, risk attitudes describe people's preferential actions regarding a potential loss. As opposed to risk seeking persons, risk averse individuals try to avoid risky situations in order to achieve a feeling of security (Keynes, 1936). According to this author, a financially safe situation makes people feel happy and so we assume their happiness level decreases, when they are facing

financial risks due to a level of saving. In addition, we also evaluate the time attitude and the level of loss aversion for each participant. Therefore, we have the following hypotheses:

H2: People are happier when they act according to their self-classification:

a) Save-classified people who save are happier.
b) Spend-classified people who spend are happier.

Comparison theory

According to comparison theory, discussed more in details above, not only the amounts of money people earn, but also their ranking in comparison to other people affects their happiness. We are interested in testing whether people spend or save more when they are in competition with others. To this end, we add in our experimental treatment a high score list, i.e. we show the subjects with the largest saving. This leads to the following hypotheses:

H3: High score effect:

a) People save more when a high score is displayed.
b) People who have large wealth tend to be happier when a high score is displayed.

Intercultural comparison

Given the cultural differences between Germans and Americans, we are assuming following hypotheses:

H4: Saving or spending effects on happiness:

a) Germans are happier when they are secure about the future.
b) Americans are happier when they spend more money.

H5: High score effect:

a) Americans save more when a high score is displayed.

b) Americans who have large wealth tend to be happier when a high score is displayed.

3.3. Design and the purpose of studies

As we discussed above our main goal in this study is finding the relationship between money and happiness. In another word, we are interested to know whether people derive a higher happiness from the possession or spending of money. To do so, we designed our research study in two parts: a pen and paper questionnaire (to elicit, e.g. risk preferences) and a computer-based saving and spending game (the experiment). In total N=105 students participated in this project. The experiment was conducted at Trier University in Germany (50 subjects) and University of Nebraska in the USA (55 subjects).

Questionnaire

The questionnaire contained 19 questions about the participant's savings and investment behavior, competitive behavior, risk attitude, time preferences, and the current level of happiness (subjective level of well-being). By using the information taken from the questionnaire we are able to classify each individual into different categories or specific characteristics (e.g. need for saving) and test whether or not their behavior in the game confirms their self-assessed levels of the characteristics (or behavior). In the next section we describe the methodology to measure different indicators by evaluating the answers taken from the questionnaire.

Experiment

As initially mentioned, the experiment was a browser-based self-programmed saving and spending game. Participants only use the computer mouse and the browser. They were guided through the

experiment on the screen. Further instructions were given verbally and laid down in the questionnaire. In this study we face the problem to choose a suitable proxy for consumption good in order to measure the effect of spending money. To do so, the chosen proxy should be able to satisfy a crucial condition: it has to be valuable for all the participants. We chose "time" since we believe that every person would prefer to lose less of his or her lifetime rather than more during the whole experiment session and no one prefers to have less time. Therefore, we design the experiment as following: the entire session lasts up to a maximum of 55 minutes for each participant, but it can be much shorter depending on a participant's luck and spending behavior. Participants can reduce the waiting time by spending (virtual) money. In other words, in this experiment subjects can save money and wait more (losing time) or spending money to wait less (losing less time).

In another treatment in our experiment additionally a high score is displayed. The participants in this treatment group (N=53) could see this screen during the experiment (see Figure C.1, Appendix C) which showed the top 5 account balances of all players who played thus far.

The game

The game simulates a periodic income in each round, which can be spent or saved. Table 3.1 shows the workflow of the experiment. The game starts with an initial balance of 500 ECU (Experimental Currency Unit). The ECU balance is shown in the top of the screen (see Figure C.2, Appendix C) throughout the whole game and shows how much money is currently available at the participant's disposal. The ECUs can be used to save or spend. Each 100 ECU are equivalent to one minute of time in this experiment. Each round takes 5 minutes, if a participant does not spend any money. As we have said before, participants are allowed to reduce the time by spending their ECU.

However, unspent ECU are carried over to the next round's balance. At the beginning of each round the participant is asked to select how much money should be spent on the reduction of waiting time. The system then sets the countdown appropriately to 5 minutes less the amount of time bought. Then, the participant is asked to select a happiness level on a scale from one to ten (first happiness query: H^{pre}). In the next step the system rolls a die and calls up a loss event with a chance of one third. The participant can see whether the loss event occurred or not and is asked to select a happiness level again (second happiness query: H^{post}). If a loss event occurs, the participant loses 1,000 ECU. A bankruptcy test checks if the participant's balance fell below zero ECU due to the loss event. In case the balance drops below zero ECU, the system sets the balance to zero again and, as a punishment, the participant has to wait for an additional five minutes after the ordinary countdown timer. After each round the system tests if the experiment is already in the final round (round 6). If not, the system adds 500 ECU to the participant's balance and increments the round number by one. Otherwise the experiment ends after the countdown timer. A new round starts if the round number is below 6 and the entire process starts over from the point where the participant is asked to choose how much money he or she wishes to spend in order to wait for a shorter period. All data about the participant's selections, e.g. the happiness level, the amount of ECU spent and whether he or she experienced a loss event are saved in a database. The design of the experiment is shown in Figure 3.1. No money from the saving is paid out at the end of the experiment. Savings have therefore only two functions: to reduce the danger of a bankruptcy event (with the subsequent additional waiting time) and they allow the subjects to feel good about their savings, in particular

when a displayed high score allows social comparisons. While the first reason is irrational (risk aversion), the second is purely psychological.

Terms and Conditions

The subjects were prohibited to open any other windows, tabs, or programs during the entire experiment. To enforce this, the program was operated only with the mouse. Mobile phones had to be shut down during the session, and there were no other devices, books or written text allowed that may distract the participant or makes this waiting time more attractive. Participants could neither see nor hear what others were doing during the experiment. Disobedience resulted in an exclusion from the project. In fact, one person had to be excluded because of violation of these rules and his data was not included in our analysis. All other participants followed the instructions and terms and conditions.

3.4. Methodology

The following gives an overview about the procedure of the data evaluation in this paper. This includes showing how the relevant measures have been derived from the participants' responses to the survey and an overview of the variables.

Measured level of happiness

As we have mentioned in Section 3.2, there are many different ways to measure happiness. In this study we used a self-reporting where participants were asked to select a happiness level on a scale from one to ten. The questions were the following:

- *How happy are you at this moment?*
- *How happy are you overall considering your current living situation/environment?*

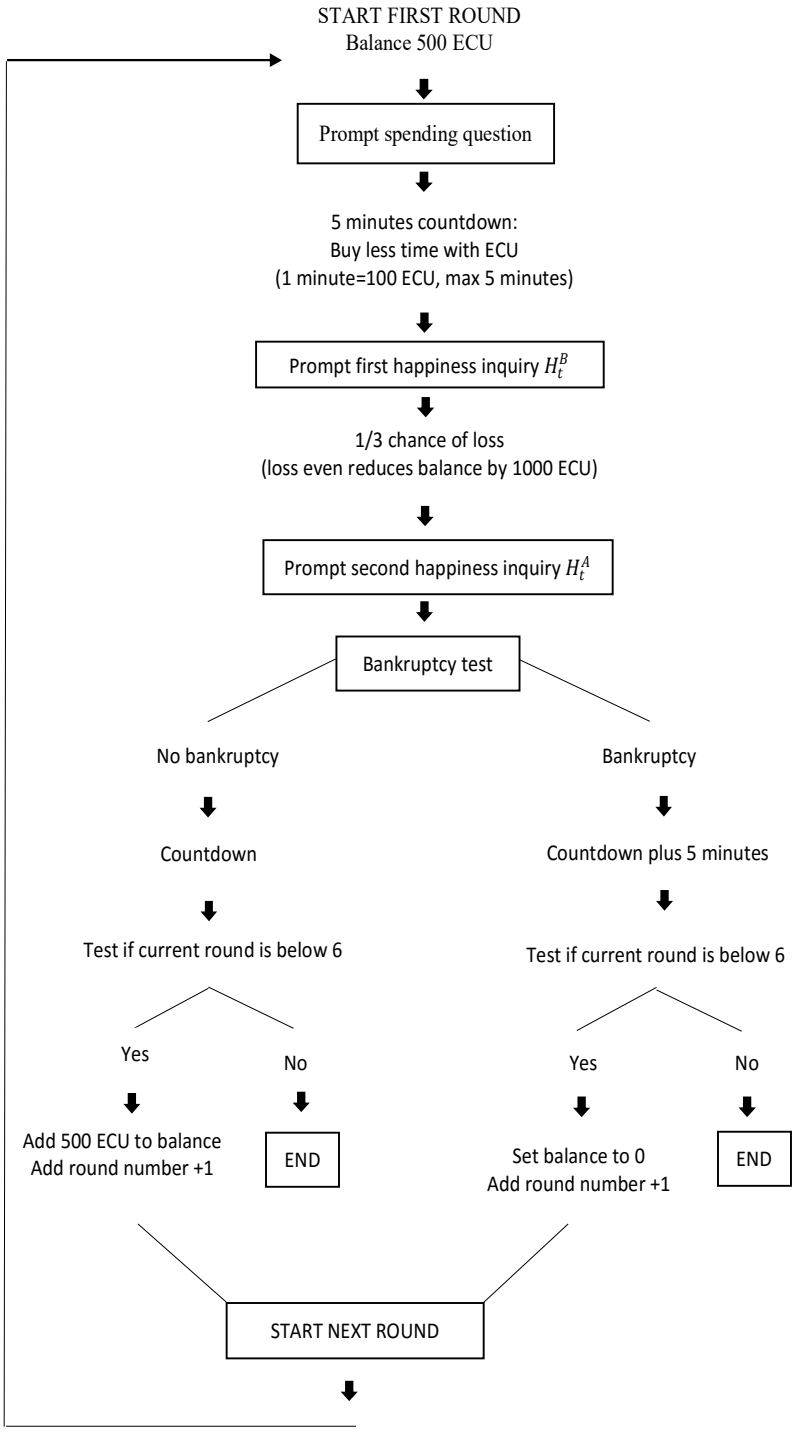

Figure 3.1 - Design of the Experiment

Measured level of saver and spender

To measure a participant's propensity to save or spend we used the questions from Fünfgeld and Wang (2009):

- *I feel uncomfortable when I do not have any savings for bad times.*
- *It is indispensable for me to take care of my financial future.*
- *I spend money when I am unhappy or frustrated.*
- *Special offers lure me to buy products.*
- *I rather enjoy spending than saving money.*

Participants indicated their savings and investment behavior on a scale from one to five (1= does not apply; 5 = applies). Utilizing a statistical factor analysis, we extracted the same two factors as Fünfgeld and Wang (2009), (Table 3.1). Here, the factor 1 stands for "free spending". We defined this variable in our analysis as "spender". It measures a respondent's propensity to consume (spend money). Factor 2 stands for "precautionary saving". We defined the variable as "saver", which corresponds to the perceived importance of a person's financial precautions. Participants with a high score tend to desire financial safety in case of unpredictable costly incidents in the future. Those people have the opinion that precautionary saving for the future is indispensable (Fünfgeld and Wang 2009). Although a strongly negative correlation was assumed between Spender and Saver, we found a zero correlation coefficients between them in our data which does confirm the similar surprising results of Fünfgeld and Wang (2009). Cryder et al. (2008) found that special offers for some people are appealing at times when they are unsatisfied or unhappy - a finding we try to capture in our analysis. Our data suggests that the savers group (Saver > 0) in Germany is significantly unhappier than the group of people who do not categorize themselves as savers (Table

3.2). The rationale for this finding can be an inherently higher fear of the future amongst Germans. In the USA, in contrast, savers group tends to be happier. For the spenders group we did not find a deviation in the happiness level from the savers group. We will discuss about it in more details in Section 3.5.

Self-evaluation of saving and investment behavior	*Component*	
	1	*2*
Question 1	-.079	.834
Question 2	.044	.816
Question 3	.766	.181
Question 4	.699	.011
Question 5	.688	.299

N=105

Extraction method: Principle Component Analysis

Rotation method: Varimax woth Kaiser Normalization

Table 3.1 - Factor analysis – Saver and Spender

			Mean	*Std. Deviation*	*p-value*	*T*	*df*
GER	Current happiness (quest 23)	Saver-group	6,452	1,368	0,000	-4,82	298,0
		No-saver-group	7,211	1,244			
	Overall happiness (quest 24)	Saver-group	6,387	1,777	0,010	-2,60	298,0
		No-saver-group	6,947	1,857			
USA	Current happiness (quest 23)	Saver-group	7,645	1,408	0,012	2,53	328,0
		No-saver-group	7,250	1,397			
	Overall happiness (quest 24)	Saver-group	7,516	1,971	0,461	0,73	327,9
		No-saver-group	7,375	1,500			

Table 3.2 - T-test between savers- and non-savers-group

Measured level of competitive behavior

The following questions about a participant's competitive behavior are taken from the questionnaire used by Houston (2010) which can measure how willingly people take part in competitions. (1= Does not apply, 5 = Applies):

These questions are scored on a scale from one to five in a consecutive order (i.e., 1→1, 2→2, 3→3, …):

- *I often try to outperform others.*
- *I like it to participate in competitions.*

These questions have a scale from one to five in a reversed order (1→5, 2→4, 3→3,…):

- *I try to avoid competitions with others.*
- *I feel uncomfortable in situations with competition.*
- *I avoid conflicts by subordinating myself within a group.*

For the reliability analysis we use Cronbach's Alpha which turned out to be large enough with a value of 0.723.[19] We define the variable "competitiveness" which equals the sum of all scores of the previous questions divided by 5. A high value of this variable indicates the participant is rather inclined to take part in competitions when possible, or he or she likes being in a competitive situation, respectively.

Measured level of risk attitude and loss aversion

On a scale from one to ten we asked two questions regarding the participants' self-evaluation of risk behavior (1= risk averse and 10 = risk loving). The questions were following:

[19] Without the "Question I avoid conflicts by subordinating myself within a group." the value of the Cronbach's alpha amounts to 0.797.

- *Are you generally a risk seeking person or do you try to avoid risk?*
- *In financial decisions, are you generally risk seeking or do you try to avoid risk?*

The questions regarding risk aversion as stated above resulted in a Cronbach's Alpha of 0.69. We defined two variables to measure risk aversion. First, we measure risk aversion exclusively in regard to financial decision with the variable "Financial risk aversion", and second, we measure risk aversion in a variable that combines financial decisions and general risks "Risk aversion ". To measure loss aversion, we applied the following lottery question from the survey "International Test on Risk Attitudes (INTRA)" which was constructed by the University of Zurich (Rieger et al., 2015):

> *"In the following lottery you have a 50% chance to win or lose a certain amount of money. The loss is predetermined. The probability to lose $50 is 50%. Please indicate the minimum payment in case of a gain at which you would accept the lottery."*

The variable "Loss aversion" is calculated as the minimum lottery gain acceptable by the participant divided by 50.We measure loss aversion in our study, because of its well-studied and documented effect on human behavior, especially in the context of investments.[20] Economic theory is based on rationally acting people (expected utility theory, as introduced by Von Neumann and Morgenstern 1944), which only holds under certain criteria. However, researchers found that people actually do not always act rationally, and so there was the need to find a model to explain those discrepancies discovered between

[20] For a good overview of the study of loss aversion and its effects, see Zamir (2014).

utility theory and observed human behavior. Prospect theory (and its concept of loss aversion), introduced by Kahneman and Tversky (1979), is a model that can explain those discrepancies very well and is used extensively in the study of human behavior, particularly in the fields of behavioral finance and behavioral economics. In short, prospect theory can explain why people attach more value to their possessions than they are actually worth (endowment effect), why people fear and value losses stronger than gains, and also extend the reference point analysis, first introduced by Markowitz (1953).

Time preference and time discounting

We measured time preferences in two different ways. First, we used two binary choice questions which we derived from a question used by Frederick (2005):

- *What alternative would you prefer?*
    a) *A payment of $1,700 in this month.*
    b) *A payment of $1,900 in the next month.*
- *What alternative would you prefer?*
    a) *A payment of $2,200 in this month.*
    b) *A payment of $2,300 in the next month.*

The first question corresponds to an interest rate of 11.76% per month or an annualized interest rate of 279.89%. This is consistent with the interest rate used by Frederick (2005). The second question equates to an interest rate of "only" 4.55% per month which still amounts to an annualized interest rate of 70.48%.[21] Since we were in need to find a variable that is influenced by personal preferences as little as possible we chose time in our experiment. As a consequence, we test the time discounting and use it for our further analysis as

[21] Both annualized interest rates assume a monthly compounding at a monthly interest rate equal to the first month.

control. Our intention is to better assess an individual's evaluation of interest rates, or as the case may be, to assess how patient the participant is with two "wait-or-not" questions. Therefore, we defined the variable "patient" as such that a participant must answer both questions with B (i.e. "wait") to be classified as very patient, in which case he or she receives a patience score of 3. Participants who wait in the first question, but do not wait in the second question receive a patience score of 2. Those who waited in neither of the questions receive a low patience score of 1. A participant who is willing to wait in question 2, but is not willing to do so in question 1 is considered as having given an erroneous answers and hence is not assessed with a patience score. In such a case the data is not used in the analysis (This was the case only for 4 subjects). To compute the implicit discounting factor, we used the following two questions taken from Wang et al. (2016). The authors asked participants for an amount of a one year (ten year) delayed payment which makes them indifferent with an immediate payment.

- *Please consider the following alternatives and indicate what the least amount X must be in order to make both alternatives equally attractive for you:*
    a) *A payment of $ 100 now.*
    b) *A payment of $ X in a year.*
- *Please consider the following alternatives and indicate what the least amount X must be in order to make both alternatives equally attractive for you:*
    a) *A payment of $ 100 now.*
    b) *A payment of $ X in 10 years.*

We calculated the marginal rate of substitution between consumption now and consumption at a later point in time utilizing

the classical discounting approach that led us to an annualized yield in Germany (USA) of 388% (707%) and a 10 years return of 39% (38%) (Table 3.3).[22] We can see that people attach much more importance to money in the near future, i.e. the discount factor is much higher there. Time preferences are hardly influenced by actual interest rates and the tendency for this so called hyperbolic discounting is the norm. In the following section we go into this model in more detail.

Quasi-hyperbolic discounting model:

Our second approach to assess an individual's time preference is a quasi-hyperbolic discounting model. This model, which is also called the "beta-delta" model, has been used by Phelps and Pollak (1968) to study intergenerational discounting and by Laibson (1997) to intra-personal decision problems. The utility for payment x_t at time $t = 1, 2, \dots, T$ is thereby given as: $U = \sum_{t=1}^{T} \beta \delta^t u(x_t)$. The beta variable is called present bias and delta is referred to as the long term discount factor. A larger beta implies less present bias. If $\beta = 1$, the quasi-hyperbolic discounting model is identical to the classical discounting model. According to Wang et al. (2016), beta and delta are calculated as following:

$$\delta = \left(\frac{F_{1ye}}{F_{10year}}\right)^{1/9}, \qquad \text{Equation (3.1): Delta in hyperbolic discounting}$$

$$\beta = \frac{100}{\delta * F_{1years}}, \qquad \text{Equation (3.2): Beta in hyperbolic discounting}$$

where F_{1yea} is the payment in one year and $F_{10years}$ is the payment in ten years. As we expected in accordance with the results of the classical discounting approach, the beta for US participants (0.40) is smaller than for German participants (0.54). Thus, Americans

[22] Trimmed by 5%.

exhibit a larger present bias (Table 3.3).[23] However, the long term discount factor (delta) is marginally smaller (by 0.02 points) for Americans than for Germans, indicating slightly more patience in the long term. Albeit, neither differences in beta and delta are statistically significant (Table C.4 and Table C.5, Appendix C).

		Mean	*5% Trimmed Mean*
GER	Subjective discount rate p.a. 1-year question	704%	388%
	Subjective discount rate p.a. 10-year question	40%	49%
	Present bias (beta)	0.54	0.45
	Long term discount factor (delta)	0.82	0.82
USA	Subjective discount rate p.a. 1-year question	9056%	707%
	Subjective discount rate p.a. 10-year question	42%	38%
	Present bias (beta)	0.40	0.38
	Long term discount factor (delta)	0.84	0.84

Table 3.3 - Time preferences and time discounting

3.5. Results

In the following sections we discuss our data and results in-depth. All variables used can be found in Table C.1 in Appendix C.

Descriptive statistics

The data come from the questionnaire and the experiment which were completed by a total of N=105 participants. A summary of the descriptive statistics is shown in Table 3.4. In the complete dataset 56% of the participants were female and the average age of all participants was 23.6 years. We had 53 participants who played the experiment with the high score displayed on their screen and 52 participants without it. Before starting the experiment, Americans

[23] Trimmed by 5%.

were slightly happier than Germans. The average level of happiness in Germany and USA were 6.74 and 7.47, respectively. The loss event occurred in 30.5% of all rounds played, a little bit less than the expected value (33.33%). The average number of bankruptcies and the average amount of savings in each round are also presented in Table 3.4. The diagrams below shall provide a deeper insight into the test persons' behavior. Only statistically significant results will be mentioned.

The first graph (Figure 3.2) shows the overall spending behavior in each round (with and without high score). We see that the subjects without high score spend more money than those with a high score display, apart from the first and the last round. It may be that individuals who played with high score changed their spending behavior in the second round after realizing that they need to save money in order to become one of the "best" players. After round five, those who did not even come close to their competitors according to the amount of saved money understood that there is no chance to improve anymore and spend more. The second diagram (Figure 3.3) shows that people from Germany first save their money and only after some time start spending more. Americans, by contrast, spent significantly larger amounts, already in the first round. However, Germans spend even more money than individuals from the USA in round two, three, four and five.

	N	*Age*	*Female*	*Current Happiness*	*Percentage of loss event*	*Average number of bankruptcies*	*Average saving per round*
All	105	23.5	56%	7.12	30.5%	1.21	310 ECU
GER	50	24.1	64%	6.74	29.7%	1.12	287 ECU
USA	55	23.0	49%	7.47	31.2%	1.29	333 ECU

Table 3.4 - Descriptive Statistics

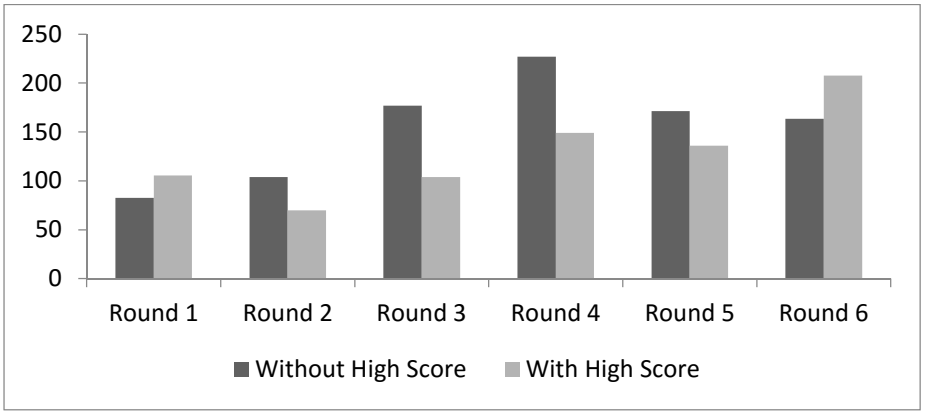

Figure 3.2 - Spending behavior with and without high score display

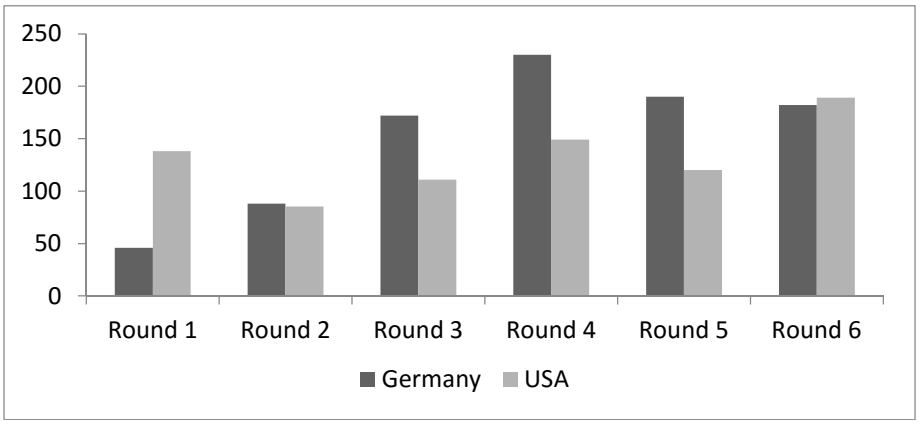

Figure 3.3 - Spending behavior in Germany and the USA

Money and happiness between participants with different financial attitudes and personal characteristics

In this section we test the hypotheses (which we introduced in Section 3.2) related to individual's personal characteristics and explore how these affect the outcome of the experiment, i.e. happiness and saving. As we mentioned before, by using the questionnaire we categorized participants regarding their financial attitudes into different groups: risk averse (and financially risk averse) or risk lover (and financially risk lover), competitive or not competitive, patient or

not patient and finally, saver or spender. Moreover, for each participant we measured its loss aversion, present bias and time discounting rates. Therefore, we are going to answer two main questions: First, how do individuals' personal characteristics affect the actual saving? And second, how do individuals' personal characteristics affect the happiness induced by saving? In addition, we test how individuals' behaviors and their happiness were influenced by displaying a high score.

Actual saving

As we described before, participants in each round of the experiment had the possibility to save or spend their money. By spending money, they were able to reduce the waiting time. On the other hand, saving the money is crucial in order to have more security: If participants do not have enough money in their account, they are more likely to experience bankruptcy and its consequence, which is wasting much more time. Therefore, we are interested in knowing to what extend participants play according to their self-classification which we obtained from the questionnaire. Can we find any relationship between self-classified savers/spenders and their actual saving/spending (H1)? Moreover, we explore the effect of high score displayed on participants actual saving (H3). In addition, we are going to test if there is any relationship between saving/spending behavior of participants and their financial attitude such as the level of risk aversion, loss aversion and time preference. To this aims, we employ OLS panel regression models (Table 3.5). Our main dependent variable is actual saving of individuals during the experiments. We have N=105 subjects, each of them plays in 6 rounds, leading to more than 600 observations.

According to the results of Model 1, there is a no significant correspondence between actual saving of participants and their self-classification as a saver, i.e. we cannot confirm that participants who classified themselves as a saver save more. Model 2 reveals a negative correspondence (significant at the 1% level) between actual saving of participants and their self-classification as a spender which means that participants who classified themselves as a spender save less (spend more).

We add control variables, in particular, controlling for round effects. Moreover, we use some dummy variables in our model which were taken from the experiment`s outcome: “Totally secure” equals 1 if the participant's wealth was large enough so there is no chance of going bankrupt within the experiment anymore, 0 otherwise; “Bankruptcy danger” equals 1 if the participant was in danger of bankruptcy in the current round (wealth < 1,000 ECU), 0 otherwise; “Unlucky” equals 1 if the loss event occurred in more than 1/3 of the rounds played, 0 otherwise. You may find the list of control variables in more details in Table C.1, Appendix C.

Model 3 shows the results of regression after controlling for our list of control variables. As we can see, the coefficient is not anymore statistically significant.

There are some other results taken from Model 3. For instance, participants who experienced a loss event or bankruptcy in the previous round save significantly more in the next round. This is not surprising because their balance account is low and they try to collect more money to reduce the danger of bankruptcy. Moreover, we see that the amount of saving is reduced over time.

To sum up, there is no robust relation between self-classification as “saver” or “spender” and actual saving and spending behavior. H1 is not supported.

Dependent V.	*Save*	*Save*	*Save*
Model	*(1)*	*(2)*	*(3)*
Saver	40		
	(25.64)		
Spender		-69***	11
		(25.54)	(15.67)
Control V.			
Round			167***
			(14.83)
Loss before			-138**
			(55.05)
Bankruptcy before			-120*
			(64.23)
Had bankruptcy			-316***
			(44.72)
Had loss event			-75
			(51.30)
Totally secure			440***
			(46.16)
Bankruptcy danger			-661***
			(42.22)
Female			7.6
			(31.05)
Unlucky			-17.29
			(38.88)
Constant	695***	695***	423***
	(25.51)	(25.42)	(102.1)
N	630	630	525
R^2	0.003	0.011	0.757

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.5 - Actual saving – Savers/Spenders

In the next step, we test hypothesis H3, i.e. how displaying a high score affects the actual saving. To this aim, participants were divided into two different groups: The first group of participants could always see the first 5 ranked people and the second group could not. We displayed high scores to test whether social ranking affects saving/spending behavior of participants. Our results in Model 1 (Table 3.6) reveal that people who played in the high score treatment saved significantly more.

Dependent V.	*Save*		*Save*		*Save*	
Model	*(1)*		*(2)*		*(3)*	
High score	99**	47***				
	(50.98)	(14.63)				
Competitiveness			-65**	-3.43	-108***	-27**
			(32.10)	(9.88)	(40.91)	(12.41)
High score x Competitiveness					25*	14***
					(15.43)	(4.44)
Control V.						
Round		-24***		-24***		-24***
		(8.62)		(8.71)		(8.64)
Wealth at begin of round		1***		1***		1***
		(.02)		(.026)		(.02)
Loss before		99***		101***		100***
		(27.44)		(27.71)		(27.47)
Bankruptcy before		200***		193***		198***
		(32.25)		(32.51)		(32.48)
Had bankruptcy		-66***		-66***		-59***
		(22.56)		(23.43)		(22.56)
Had loss event		54**		55**		48**
		(25.17)		(25.86)		(23.33)
Totally secure		15		15		14
		(24.78)		(25.04)		(25.75)
Bankruptcy danger		-26		-27		-28
		(25.65)		(25.94)		(24.83)
Female		4		-.4		.26
		(14.68)		(15.33)		(15.20)
Unlucky		53***		48***		50***
		(18.99)		(19.21)		(19.05)
Constant	545***	-279***	906***	-191***	917***	-181***
	(80.84)	(56.82)	(106.21)	(62.93)	(106.26)	(62.46)
N	630	525	630	525	630	525
R^2	0.006	0.9427	0.0066	0.9427	0.0110	0.9427

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.6 - Actual saving – High score

Dependent V.	*Save*		*Save*	
Model	*(1)*		*(2)*	
Risk avers	37*** (11.65)	5* (3.38)	38.86*** (10.63)	9.4** (4.55)
Risk Avers x Bankruptcy Danger			-33.9** (14.48)	-8.1 (6.78)
Control V.				
Round		-24*** (8.69)		-24*** (8.68)
Wealth at begin of round		1.06*** (.026)		1.05*** (.026)
Loss before		100*** (27.64)		100*** (27.63)
Bankruptcy before		192*** (32.43)		191*** (32.43)
Had bankruptcy		-65*** (22.77)		-66*** (22.77)
Had loss event		57** (25.34)		58** (25.34)
Totally secure		14 (24.98)		13** (24.97)
Bankruptcy danger		-29 (25.85)	-838*** (80.86)	10 (41.86)
Female		.03 (14.77)		.03 (14.76)
Unlucky		48** (19.09)		47** (19.08)
Constant	503*** (64.57)	-229*** (54.27)	1077 (61.14)	-245*** (56.00)
N	630	525	630	525
R^2	0.016	0.941	0.625	0.942

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.7 - Actual saving – Risk Aversion

Dependent V.	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B
Model	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Save	.001 (.0001)	.001*** (.0001)	-.0002 (.0005)			
Saver		-1.25*** (.31)	-1.46 *** (.33)			
Save x Saver		.144*** (.040)	.173*** (.042)			
Spend				.001*** (.0004)	.001*** (.0004)	.0006 (.0005)
Spender					-.29** (.115)	-.104 (.120)
Spend x Spender					.001** (.0004)	.0004 (.0005)
Control V.						
Round			-.38*** (.108)			-.37*** (.110)
Wealth at begin of round			.001** (.0006)			.001*** (.0003)
Loss before			-.15 (.34)			-.26 (.35)
Bankruptcy before			-1.40*** (.41)			-1.2*** (.424)
Had bankruptcy			.48* (.28)			.30 (.29)
Had loss event			.27 (.31)			.06 (.32)
Totally secure			-.43 (.31)			-.42 (.31)
Bankruptcy danger			.19 (.32)			.19 (.32)
Female			.25 (.19)			.13 (.19)
Unlucky			-.41* (.23)			-.44* (.24)
Constant	5.84*** (.132)	5.78*** (.132)	6.68*** (.66)	6.41*** (.116)	6.39*** (.116)	7.1*** (.67)
N	630	630	525	630	630	525
R^2	0.105	0.124	0.3104	0.023	0.034	0.284

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.8 - Actual saving and happiness

Dependent V.	H_t^B		H_t^B		H_t^B		H_t^B		H_t^B	
Model	*(1)*		*(2)*		*(3)*		*(4)*		*(5)*	
Country	GER	USA	GER	USA	GER	USA	GER	USA	GER	USA
Wealth at begin of round	.001*** (.0001)	.0014*** (.0002)					.001* (.0005)	-.0004 (.0006)	.0006 (.0008)	-.0009 (.00069)
High Score			-.54** (.253)	-.73** (.27)	-.95*** (.26)	-.78*** (.25)	-.82* (.39)	-1.6*** (.408)	-1*** (.478)	-1.93*** (.402)
High Score x Money							-.00 (.0003)	.001*** (.0003)	.0004 (.0004)	.001*** (.0003)
Control V.										
Round					.116 (.13)	-.34*** (.12)			-.167 (.158)	-.544*** (.143)
Loss before					-.99* (.46)	-.23 (.48)			-.516 (.480)	-.076 (.474)
Bankruptcy before					-1.1* (.57)	-2.3*** (.54)			-1.12* (.588)	-1.92*** (.556)
Had bankruptcy					-.18 (.43)	.10 (.40)			.129 (.438)	.286 (.408)
Had loss event					-.14 (.43)	.22 (.46)			-.069 (.431)	.393 (.464)
Totally secure					.23 (.40)	.02 (.39)			-.382 (.449)	-.385 (.434)
Bankruptcy danger					-.28 (.37)	-.73* (.34)			.437 (.458)	.007 (.440)
Female					.58* (.27)	-.32 (.27)			.484* (.272)	-.086 (.269)
Unlucky					-.34 (.40)	-1.0*** (.31)			-.274 (.402)	-.954*** (.308)
Constant	5.47*** (.198)	5.58*** (.208)	7.4*** (.40)	7.8*** (.43)	7.9*** (1.02)	10.2*** (.92)	6.60*** (.60)	8.09*** (.64)	7.819 (1.202)	11.19*** (1.08)
N	300	330	300	330	250	275	300	330	250	275
R^2	0.143	0.135	0.015	0.021	0.263	0.372	0.181	0.181	0.2927	0.4141

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.9 - Intercultural comparison - Happiness

This effect remains positively significant at the level of 1% after adding the control variables, confirming H3.a. As we have mentioned before, we classified participants regarding their level of competitiveness. In this section, we test to what extend self-classified competitive participants saved differently when they could see the high score. The results, presented in Model 2, 3, 4 (Table 3.6), show that competitive participants save significantly more, but only when the high score was displayed. The results remained significant at the level of 1% after controlling for other factors. We also classified participants regarding their financial attitudes. In this section we explore if there is any association between these attitudes and actual saving among participants.

According to the regression results, we found a positive and significant correlation at the level of 1% between participants' risk aversion rate and their actual saving (Table 3.7, Model 1). The result remains statistically significant, albeit only at 10% level, after controlling for the other factors. This difference, however, does not change when facing the risk of immediate bankruptcy (compare Model 2). It is interesting to notice that we also did not find time preferences to be a significant factor for saving decisions in our experiment (Detailed results on request).

Actual saving and happiness

So far we considered the effect of displaying a high score and the effect of individuals' personal characteristics on their saving behavior. In this section, we explore to what extend each of those factors affect the happiness induced by saving. In other words, we want to know whether self-classified savers (spenders) who save (spend) are happier or not (H2). Our main dependent variable is "happiness before the loss event" (H_t^B) which is elicited from

participants in each round directly after the waiting time, but before the determination of a loss event (see Figure 3.1). In the first step, we explore the effect of actual saving on happiness. The results are shown in Table 3.8. In Model 1 the positive correlation between happiness and saving is not statistically significant. Therefore, we cannot say anything regarding the influence of saving or spending on happiness. However, for those who classified themselves as saver, saving and happiness are positively correlated (Model 2), even after controlling for other factors which might affect happiness (Model 3). Therefore, we can confirm that self-classified savers who save are happier. We did the same analysis for participants who classified themselves as spender. In Model 5, our main explanatory variable, "Spend x Spender", is positively related to the level of happiness. So, participants who classified themselves as spender are happier when they spend more. This result is, however, not statistically significant after controlling for other factors (Model 6). To sum up, this confirms H2.a, but H2.b in not entirely confirmed. Regarding the correspondence between happiness induced by saving and individual financial attitude we could not find any significant results. You may find the results in details in Table C.2 and Table C.3 in appendix C.

Money and happiness across cultures

This section is about differences between Germans and Americans, regarding their savings/spendings and happiness. First, it may be not be surprising to see that wealthier participants are happier both in Germany and in the USA (Table 3.9, Model 1), confirming the previous literature of money and happiness mentioned in Section 3.2. While this holds true in both countries, there are striking differences when taking a closer look, as we will see.

High Score effect

The main question we are going to explore in this section is how happiness induced by the social status differs between Germans and Americans. First, our finding is that displaying high scores has a significantly negative effect on happiness for both countries (Table 3.9, Model 2). The effect remained statistically significant at 1% level after controlling on other factors, for both countries (Table 3.9, Model 3). One possible explanation is that, on the whole, people feel more pressure and anxiety when they compete with others. Especially in our case where subjects did not have a high chance to be in the top 5 high score list.

The story may change when we consider both the effect of displaying a high score and the effect of wealth, simultaneously. We assume that, though people might dislike competitive circumstances, wealthier people are more likely to like this environment. The results, however, confirm the assumption only for Americans (Table 3.9, Model 4). It remained significant after adding the control variables to the model (Table 3.9, Model 5). Therefore, we confirm that Americans who have large wealth tend to be happier when a high score is displayed (H5). One possible explanation is that Americans with higher wealth feel happy about having achieved a higher social status, while Germans do not see such a connection.

Displaying the high scores also might affect individuals` savings/spendings. In this section we explore how this effect differs between Germans and Americans. The results (Table 3.10, Model 1) show that when a high score was displayed only Germans saved significantly more. But this result is not enough to say that Germans are more influenced by displaying a high score (Figure 3.3 shows that Germans saving is increasing over time).

Dependent V.	*Save*		*Save*	
Model	*(1)*		*(2)*	
Country	GER	USA	GER	USA
High Score	252*** (73.33)	-37.8 (70.1)	27 (24.01)	54*** (19.18)
Control V.				
Round			-42*** (14.20)	-23** (10.90)
Wealth at begin of round			.11*** (.039)	-.005 (.031)
Loss before			271*** (33.17)	175*** (27.26)
Totally secure			3.1 (40.77)	17 (31.87)
Bankruptcy danger			-3.23 (40.17)	-90*** (33.66)
Female			-9.2 (24.65)	17 (19.49)
Unlucky			65** (30.82)	51** (23.71)
Constant	342*** (115.9)	730*** (111.5)	-237** (83.34)	-174** (67.27)
N	300	330	250	275
R^2	0.038	0.0009	0.933	0.946

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.10 - Intercultural comparison – Saving/Spending

Dependent V.	H_t^B		H_t^B		H_t^B		H_t^B	
Model	*(1)*		*(2)*		*(3)*		*(4)*	
Country	GER	USA	GER	USA	GER	USA	GER	USA
Save	.001*** (.0001)	.001*** (.0002)			.001*** (.0001)	.001*** (.0002)	.0003 (.0007)	-.001** (.0008)
Saver			-.093 (.125)	-.38*** (.14)	-.99** (.45)	-1.5*** (.44)	-.56*** (.211)	-.34 (.216)
Save x Saver					.128*** (.06)	.168*** (.05)	.0005** (.0002)	.0001 (.0001)
Control V.								
Round							-.11 (.1626)	-.57*** (.1477)
Wealth at begin of round							.00088 (.0009)	.002*** (.0009)
Loss before							-.72 (.496)	.08 (.4942)
Bankruptcy before							-.70 (.6124)	-1.59*** (.590)
Had bankruptcy							.03 (.451)	.23 (.436)
Had loss event							-.20 (.449)	.49 (.480)
Totally secure							-.25 (.456)	-.40 (.427)
Bankruptcy danger							.63 (.465)	-.24 (.457)
Female							.74** (.298)	-.09 (.282)
Unlucky							-.008 (.407)	-.75** (.330)
Constant	5.74*** (.17)	5.92*** (.19)	6.60*** (.127)	6.74*** (.13)	5.64*** (.18)	5.91*** (.18)	5.1*** (.992)	8.50** (.937)
N	300	330	300	330	300	330	250	275
R^2	0.122	0.096	0.0019	0.0221	0.135	0.134	0.247	0.383

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.11 - Intercultural comparison – Happiness induced by Saving

Dependent V.	H_t^B		H_t^B		H_t^B		H_t^B	
Model	*(1)*		*(2)*		*(3)*		*(4)*	
Country	GER	USA	GER	USA	GER	USA	GER	USA
Spend	.001 (.0006)	.002*** (.0007)			.001 (.0006)	.002*** (.0007)	-.05 (.179)	-.16 (.162)
Spender			-.10 (.13)	-.16 (.13)	-.13 (.16)	-.44*** (.16)	-.0003 (.0007)	.001 (.0008)
Spend x Spender					.0002 (.0006)	.0001** (.0008)	-.0001 (.0006)	.001** (.0008)
Control V.								
Round							-.11 (.165)	-.59*** (.148)
Wealth at begin of round							.001** (.0004)	.001** (.0004)
Loss before							-.70 (.5049)	-.01 (.492)
Bankruptcy before							-.86 (.621)	-1.44** (.588)
Had bankruptcy							.100 (.463)	.33 (.438)
Had loss event							-.01 (.474)	.35 (.478)
Totally secure							-.27 (.463)	-.40 (.426)
Bankruptcy danger							.56 (.481)	-.17 (.4552)
Female							.63** (.284)	-.34 (.286)
Unlucky							-.09 (.420)	-.88*** (.322)
Constant	6.45*** (.15)	6.36*** (.168)	6.60*** (.12)	6.75*** (.13)	6.45*** (.16)	6.38*** (.16)	5.1*** (.992)	8.50** (.937)
N	300	330	300	330	300	330	250	275
R^2	0.008	0.044	0.002	0.004	0.010	0.066	0.247	0.383

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table 3.12 - Intercultural comparison - Happiness induced by Spending

To isolate the effect of a high score display we added the control variables to the model (Table 3.10, Model 2). The new results suggest that both Germans and Americans saved more when a high score was displayed, but the coefficient was statistically significant only for Americans. Therefore, we confirm that Americans save more when a high score is displayed (H5).

Saving or Spending effects on Happiness

In Section 5.2., we have seen that self-classified savers who save are happier (Table 3.8). Now we explore to which extend this statement differs between Germans and Americans (H4). The regression outcomes are shown in Table 3.11. The main finding is that both Germans and Americans self-classified savers who save are happier (Table 3.11, Model 3). However, after controlling on other factors, the result remains significant only for Germans. Moreover, we are interested to know how happiness induced by savings/spendings might differ across two countries for participants who classified themselves as spender. The main finding is that only Americans self-classified spenders are happier when they spend more (Table 3.12, Model 3). The results remain significant after controlling on other factors (Table 3.12, Model 4). Regarding the fact that the environment of the experiment was the same for participants in both countries, and also participants in the experiment were more or less homogenous, the most natural explanation for the above results are cultural differences between Germans and Americans.

3.6. Limitations

In this study there are naturally a couple of limitations. We have tried to overcome these limitations by improving the experimental design and adding robustness tests to the statistical analysis, but we

are aware of some restrictions. In this section we discuss some of them:

Measurement of happiness in general

Apart from the fact that the definition or identification of influencing factors is a challenging task, we must note that happiness is a field of research very sensitive to the respondents' current well-being. So, the measurement states some fundamental problems. For once, those who currently had a good day or recently experienced something that made them happy, are likely to report a higher happiness, even if they may have had a very hard time and have been unlucky in the recent past before that one lucky event occurred (Wilkinson, 2007). Therefore, happiness is not an isolated, fixed feeling, and is characterized by inconsistency. Moreover, the conditions in which an individual lives determine the well-being and as those can change, the level of happiness is varying, too (Frey and Stutzer, 2000). This has to be accepted as unavoidable, mostly because people themselves do not realize how they are affected by small simple events that linger in their minds (Wilkinson, 2007). In addition, it is also never clear to what extent the respondent gives reliable information about his or her subjective well-being and whether or not is able to estimate it (Rieger, 2015). Also, a participant's own understanding of happiness as well as his or her perception of the surroundings influence the current well-being and strongly may tilt a respondent's answer towards a better or worse reported happiness (Wilkinson, 2007). Since this paper operates with the subjective concept of happiness measurement, relevant cognitive processes are taken into account. Nevertheless, with the inclusion of cognitive processes comes complexity and imprecision. Such effects are generally not measurable at reasonable costs during studies of

happiness (Frey and Stutzer, 2000). However, there are more accurate surveying methods such as the Experience Sampling Method (Csikszentmihalyi and Hunter, 2003) or the Day Reconstruction Method (Daniel Kahneman et al., 2004), but which generally outstrip the cost budget allotted to studies of happiness and hence are likely not applicable. There are some other problems coming with the methods utilized in the study of subjective well-being: Different surveys applied vary in that they, firstly, may ask for very vague statements, secondly, may use different questions and dissimilar scales, and thirdly, some questionnaires apply other wording that can result in differently minded responses (Easterlin, 1974: 98). In our study, many of these concerns are mitigate, because we measure differences in happiness between nearby points in time when the change is most likely not influenced much by factors outside the experiment. General limitations of the measurement quality, however, surely cannot be ruled out. Cultural difference is another problem which may limit the comparability between the respondents' answers. Since the basic understanding of happiness strongly depends on its cultural values, different nations might understand the concept of well-being in different ways (Diener and Suh, 2000). These differences, however, are something we are interested in and aim to measure, so that this frequent problem of happiness research is a lesser issue for the current study.

Design and execution of this study in particular

Our sample consists only of students and, thus, the average age is not representative for the whole population. The sample is also not representative for students, since the range of majors is not spread out evenly: most participants were economics (or business) students. For a study that compares two countries, however, it is more important to

have comparable groups in both countries (Hofstede, 1991). This is the case in our study. Last but not least, interviewer effects can never be fully excluded in experiments. To minimize this effect, we conducted the study by the same interviewer at both universities throughout all experiments, and tried to exclude participants who were familiar with the interviewer. Nevertheless, some effects may remain.

3.7. Conclusions and discussion

The goal of this paper was to get more insights into the effect of money on happiness. We concentrated on two functions of money (saving and spending where saving could be precautionary saving or saving to increase social status) and explore how happiness is affected by any of these motives. Moreover, we compare participants from Germany and the USA – countries which both belong to similar level of development - and explore how cultural differences may affect the individual`s behavior regarding money and happiness. We provided data from a computer based experiment which was completed by a total of N=105 participants (50 subjects from Germany and 55 subjects from USA). Furthermore, we let participants classify themselves into several behavioral economics categories, regarding risk aversion, time preference, competitiveness and others. Our first finding is about the effect of saving and spending on happiness. We found that Germans self-classified savers who save are happier and that, American self-classified spenders who spend are happier. We propose that this difference in happiness induced by saving or spending has a root in cultural differences between Germans and Americans. It is important to notice, however, that this did not translate into another behavior: self- classified savers did not save significantly more than others. The results regarding social

comparison as a motivation for saving was interesting as well: displaying a high score made participants in general unhappier. Americans, however, were much more affected by this treatment: they saved significantly more. This suggests that social status is a more important reason for saving for Americans than for Germans. Although, in general, Americans do not save more than Germans, this pattern is changing when we put them in this more competitive situation. Americans were also most affected by entering the high score list: their happiness increased strongly! All in all, the data suggest that Germans tend to save more for precautionary motives, while for Americans social comparison is the key factor.

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Appendix B

B.A. Instruction of experiment

This is an experiment on intertemporal choice of consumption and investment in a dynamic context. You will do this experiment in three separate sessions over time: today, in two weeks, and in four weeks in a substantially similar manner. Thus, all of you must come back here in two weeks, and in four weeks.

The experiment you will do in each of these dates is composed of three phases (Phase 1, Phase 2 and Phase 3) for which different tasks. In Phase 1 you must choose between different pairs of alternatives lotteries (OPTION A and OPTION B); in Phase 2 you must choose between 20 pairs of monetary amounts in different periods of time (OPTION A and OPTION B); in Step 3 you will have to put in order of preference (1st, 2nd, 3rd) the consumption of a good (cappuccino and croissant) that respectively refer to the date that you prefer (today, in two weeks or in four weeks).

In each phase of the experiment, the experimenters will present you some sheets for each task you have to perform at that phase; they will be presented in one or more tables on which you will have to indicate, for each choice, the option which you prefer (A or B) by circling with the pen.

WARNING: This is not a test of skill in choosing the "best" OPTION among those submitted, because none of them is necessarily better than the other, but what important for you is that you must choose the option which satisfy you more you and it depends only on your taste. HOWEVER, it is very important that you choose exactly the option which you prefer for each decision you perform, because this choice could result in your payment for the entire experiment. At the end of the experiment for Phases 1 and 2 it will be raffled in fact one of the "choices" you have faced in each of them, and you shall receive the payments corresponding to the option that you will have preferred those choices. For Phase 3, instead, you will have the chance to consume the property on the date you prefer. It is, therefore, important for you to take your decisions individually and without consulting with others.

In each phase, once you have made all your decisions, wait silence that the other participants also finish their tasks. There is no rush to conclude: wait that everyone has completed their choices before proceeding to the next phase.

At the end of the experiment the investigators calculate your overall gain for the experiment (as explained below) that there will be liquidated immediately or on the scheduled date on your preferences and by fate.

Phase 1 – Lotteries

In this phase you will be provided a table like the one below it is presented 10 pairs of lotteries involving several awards and likely to gain against which you'll have to choose which you prefer to play. For each pair you will need to indicate your preference for the OPTION A or OPTION B by circling with a pencil the OPTION you prefer.

	Option A				*Option B*					
Choices	*Prob.*	*Payoff*	*Prob.*	*Payoff*	*Prob.*	*Payoff*	*Prob.*	*Payoff*	*Preferred Option*	
1	0.1	2.00	0.9	1.60	0.1	3.85	0.9	0.10	A	B
2	0.2	2.00	0.8	1.60	0.2	3.85	0.8	0.10	A	B
3	0.3	2.00	0.7	1.60	0.3	3.85	0.7	0.10	A	B
4	0.4	2.00	0.6	1.60	0.4	3.85	0.6	0.10	A	B
5	0.5	2.00	0.5	1.60	0.5	3.85	0.5	0.10	A	B
6	0.6	2.00	0.4	1.60	0.6	3.85	0.4	0.10	A	B
7	0.7	2.00	0.3	1.60	0.7	3.85	0.3	0.10	A	B
8	0.8	2.00	0.2	1.60	0.8	3.85	0.2	0.10	A	B
9	0.9	2.00	0.1	1.60	0.9	3.85	0.1	0.10	A	B
10	1.0	2.00	0.0	1.60	1.0	3.85	0.0	0.10	A	B

WARNING: This is not a test of skill in choosing the "best" OPTION among those submitted, because none of them is necessarily better than the other, but what important for you is that you must choose the option which satisfy you more you and it depends only on your taste.

HOWEVER, it is very important that you choose exactly the option which you prefer for each decision you perform, because this choice could result in your payment for the entire experiment. At the end of the experiment it will be raffled in fact one of the "choices" you have faced in each of them, and you shall receive the payments corresponding to the option that you will have preferred those choices.

You should think carefully about which OPTION you prefer for each choice.

Phase 2 – Intertemporal Decisions

In this Phase you will carry out a series of choices regarding their preference to receive an amount of money in a given "nearest" or an amount of money to a date in "the farthest." The nearest date will always today, while the more distant will vary between 1, 15, 16, 30 and 31 days from today. Below you will find a few examples of decisions that you have to take in each Round.

EXAMPLE 1

Payoff alternative	*Payment option A (pays amount below today)*	*Payment option B (pays amount below tomorrow)*	*Preferred payment option (circle A or B)*
1	200.00	200.49	A - B
2	200.00	200.82	A - B
3	200.00	201.15	A - B
4	200.00	201.65	A - B
5	200.00	202.07	A - B
6	200.00	202.48	A - B
7	200.00	202.90	A - B
8	200.00	203.31	A - B
9	200.00	204.15	A - B
10	200.00	204.99	A - B
11	200.00	205.83	A - B
12	200.00	206.68	A - B
13	200.00	208.38	A - B
14	200.00	212.70	A - B
15	200.00	217.11	A - B
16	200.00	221.60	A - B
17	200.00	226.18	A - B
18	200.00	230.86	A - B
19	200.00	235.63	A - B
20	200.00	245.45	A - B

As you can see from the table that represents the first example, every decision is presented in a different row. All decisions have the same structure and in each of them you have to decide if you prefer the OPTION A or OPTION B.

There will be presented below up to 5 tables (you can see them below) of this type. Each of them will present 20 decision making between the two OPTIONS (A or B). In each table both time and the amount of future payments will be changed. You will then have to pay attention both to the date changes and the amount of changes before you make your decision, as you can see by comparing Example 1 with Example 2. Therefore, take care to choose in each of them the option which you prefer for each decision because the choice you perform would be to actually count for your payment.

EXAMPLE 2

Payoff alternative	*Payment option A (pays amount below today)*	*Payment option B (pays amount below in 15 days)*	*Preferred payment option (circle A or B)*
1	200.00	200.25	A - B
2	200.00	200.41	A - B
3	200.00	200.58	A - B
4	200.00	200.82	A - B
5	200.00	201.03	A - B
6	200.00	201.24	A - B
7	200.00	201.44	A - B
8	200.00	201.65	A - B
9	200.00	202.06	A - B
10	200.00	202.48	A - B
11	200.00	202.90	A - B
12	200.00	203.31	A - B
13	200.00	204.15	A - B
14	200.00	206.25	A - B
15	200.00	208.38	A - B
16	200.00	210.52	A - B
17	200.00	212.69	A - B
18	200.00	214.88	A - B
19	200.00	217.08	A - B
20	200.00	221.56	A - B

Other time horizons:

Payoff alternative	*Payment option A (pays amount below today)*	*Payment option B (pays amount below in 16 days)*	*Preferred payment option (circle A or B)*
1	200.00	200.26	A - B
2	200.00	200.44	A - B
3	200.00	200.61	A - B
4	200.00	200.88	A - B
5	200.00	201.10	A - B
6	200.00	201.32	A - B
7	200.00	201.54	A - B
8	200.00	201.76	A - B
9	200.00	202.20	A - B
10	200.00	202.65	A - B
11	200.00	203.09	A - B
12	200.00	203.54	A - B
13	200.00	204.43	A - B
14	200.00	206.68	A - B
15	200.00	208.95	A - B
16	200.00	211.24	A - B
17	200.00	213.56	A - B
18	200.00	215.91	A - B
19	200.00	218.27	A - B
20	200.00	223.08	A - B

Payoff alternative	*Payment option A (pays amount below today)*	*Payment option B (pays amount below in 30 days)*	*Preferred payment option (circle A or B)*
1	200.00	200.49	A - B
2	200.00	200.82	A - B
3	200.00	201.15	A - B
4	200.00	201.65	A - B
5	200.00	202.07	A - B
6	200.00	202.48	A - B
7	200.00	202.90	A - B
8	200.00	203.31	A - B
9	200.00	204.15	A - B
10	200.00	204.99	A - B
11	200.00	205.83	A - B
12	200.00	206.68	A - B
13	200.00	208.38	A - B
14	200.00	212.70	A - B
15	200.00	217.11	A - B
16	200.00	221.60	A - B
17	200.00	226.18	A - B
18	200.00	230.86	A - B
19	200.00	235.63	A - B
20	200.00	245.45	A - B

Payoff alternative	*Payment option A (pays amount below today)*	*Payment option B (pays amount below in 31 days)*	*Preferred payment option (circle A or B)*
1	200.00	200,51	A - B
2	200.00	200,85	A - B
3	200.00	201,19	A - B
4	200.00	201,71	A - B
5	200.00	202,13	A - B
6	200.00	202,56	A - B
7	200.00	202,99	A - B
8	200.00	203,43	A - B
9	200.00	204,29	A - B
10	200.00	205,16	A - B
11	200.00	206,03	A - B
12	200.00	206,91	A - B
13	200.00	208,67	A - B
14	200.00	213,14	A - B
15	200.00	217,70	A - B
16	200.00	222,36	A - B
17	200.00	227,11	A - B
18	200.00	231,97	A - B
19	200.00	236,92	A - B
20	200.00	247,13	A - B

Phase 3 – Consuming the good

In this Phase you will carry out a ranking among some choices regarding the consumption of a good (cappuccino and croissant) in a given "nearest" or a date "farthest." The closest date is always today, the "farthest" will be two weeks and four weeks (15 or 30 days) from now. In particular, in this phase you will be asked to order based on your preferences, the following alternatives:

- Consuming a cappuccino and croissant today (immediately at the end of the experiment here in the classroom) (1 ° or 2 ° or 3 °);
- Consuming a croissant and a cappuccino in 15 days (here in the classroom experiment) (1 ° or 2 ° or 3 °);
- Consuming a croissant and a cappuccino in 30 days (here in the classroom experiment) (1 ° or 2 ° or 3 °).

Be careful that at the end of the experiment you will consume the good (cappuccino and croissant) according to your preferred date. In particular, at the end of the experiment for each of you the experimenters will control the date you favorite and you can actually consume the good at that date. For example, if you have preferred to eat the croissant and cappuccino now it all immediately consumed in the classroom (as you can see we have a thermos and packaged croissants); if you have preferred to consume the good in two weeks or four weeks, it will be done respectively in two weeks and in four weeks.

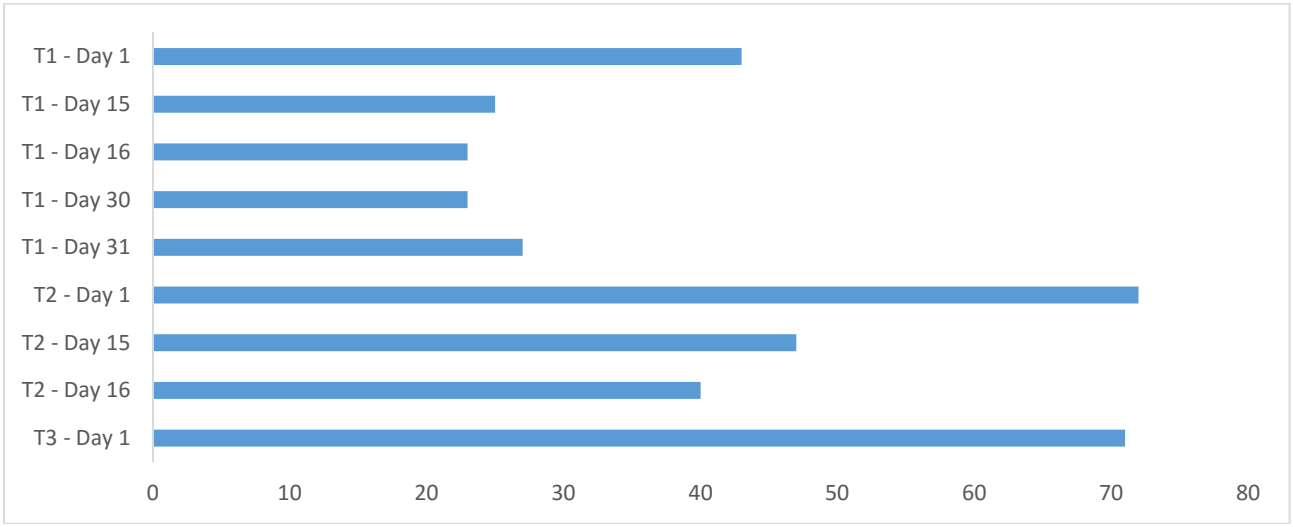
WARNING: At the end of the experiment you will always have the possibility to postpone the consumption of cappuccino and croissant with respect to the preferred date you one day. In particular, after checking the date on which you prefer to eat your croissant and a cappuccino, the investigators ask you if you prefer to postpone the consummation for a day.

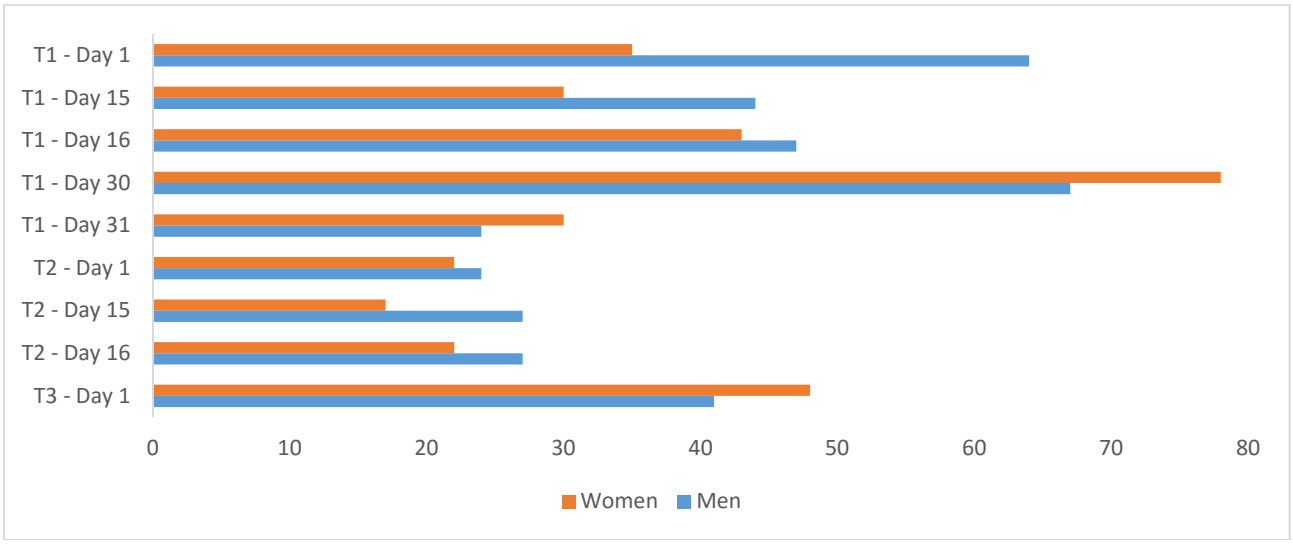
For example, if you have expressed a wish to eat the croissant and cappuccino today (in the classroom immediately) you will be asked if you prefer to consume tomorrow (at the LUISS bar). Similarly, you can choose to eat the croissant and cappuccino in two weeks and one day or between four weeks and one day if you have expressed a preference for the consumption of, respectively, well in two weeks, or in four weeks.

If you prefer to consume now then it will be done immediately; if you prefer to postpone the consumption of the good to tomorrow, you will deliver a voucher with which you can make have your cappuccino and cornetto at the LUISS bar tomorrow.

The same thing will happen in two weeks or in four weeks where you have expressed a preference for these dates for the consumption of the good.

B.B. Additional Figures





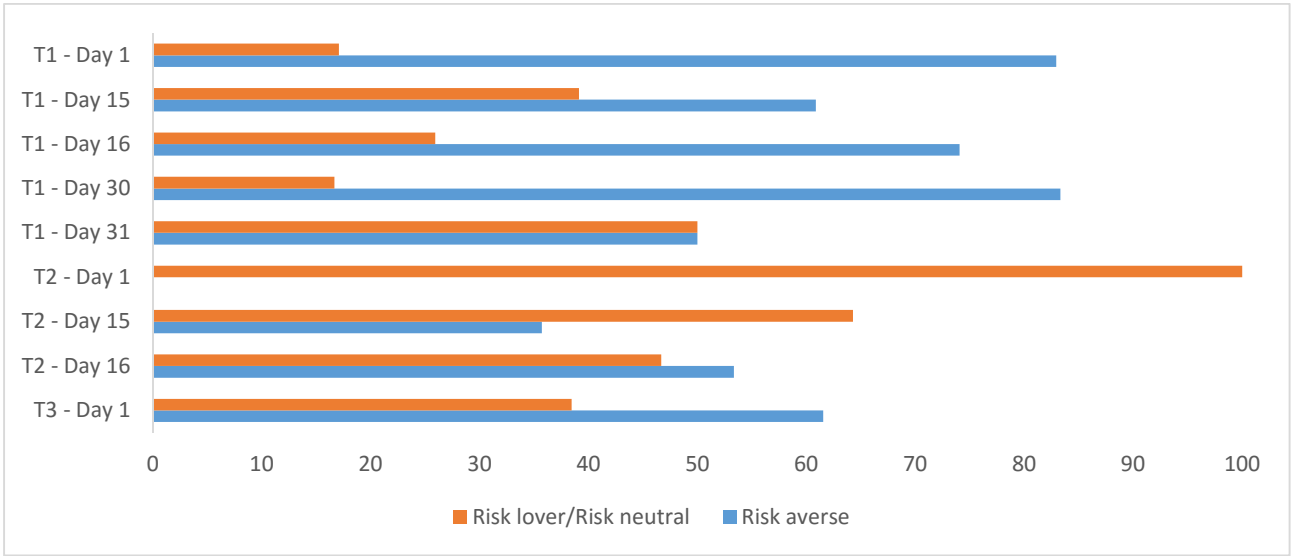


Figure B.1 - Intertemporal choices – Percentage of impatient subjects

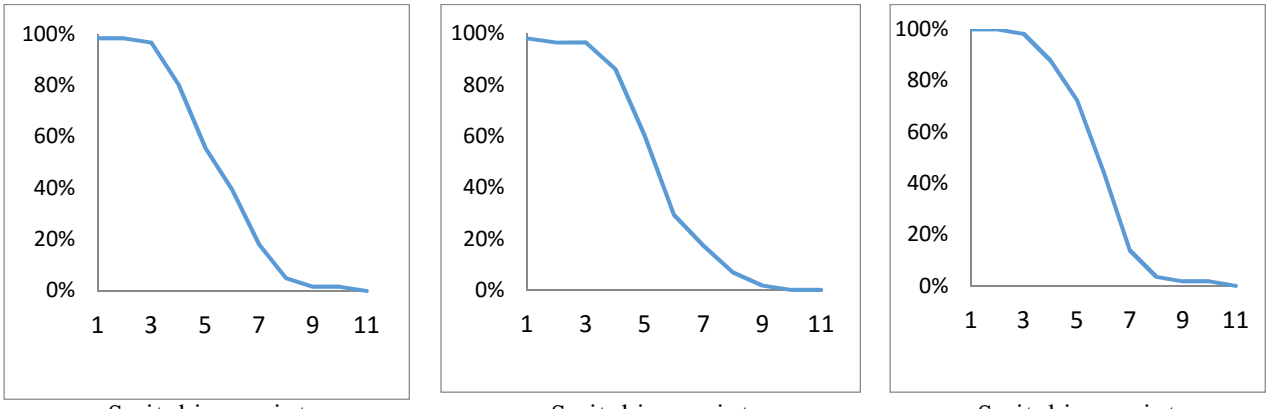
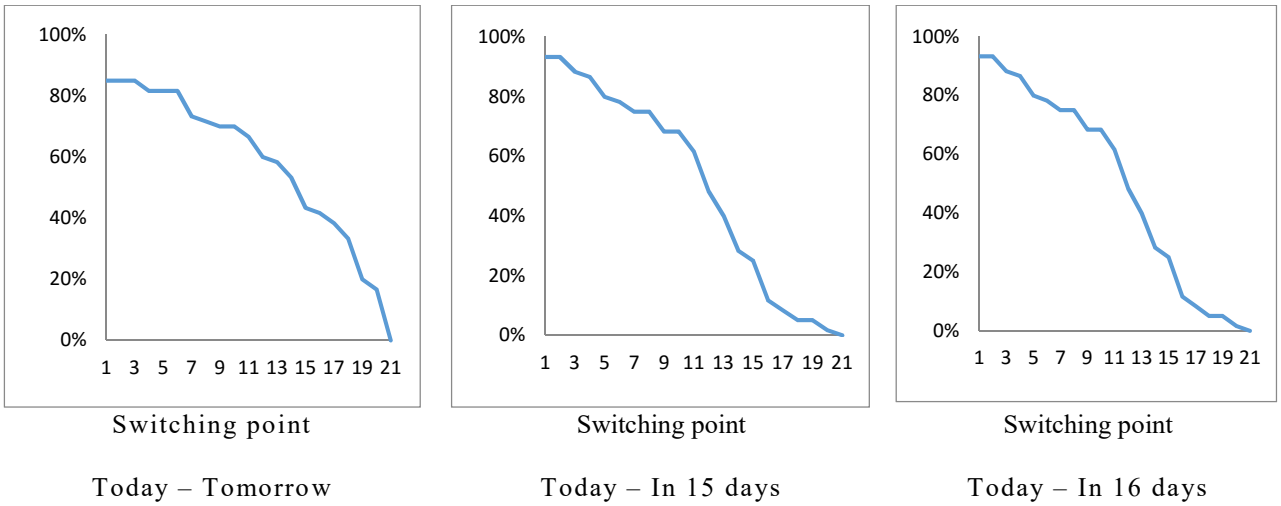


Figure B.2 - Inverse distribution function of switching point for risk aversion



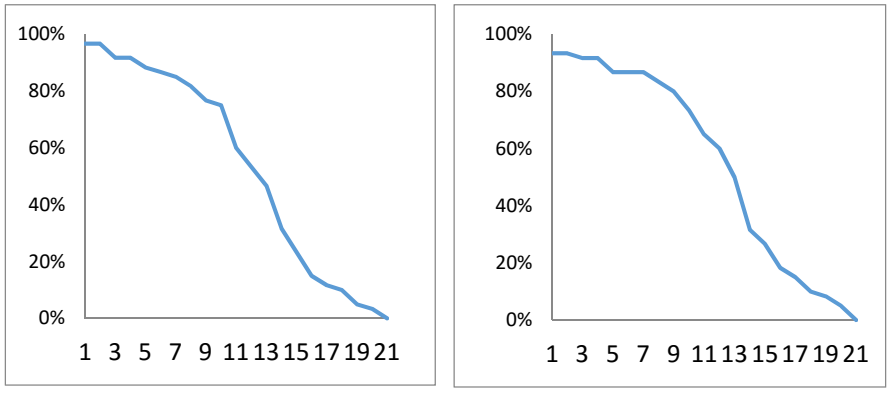


Figure B.3 - Inverse distribution function of switching point for discount rate in session 1

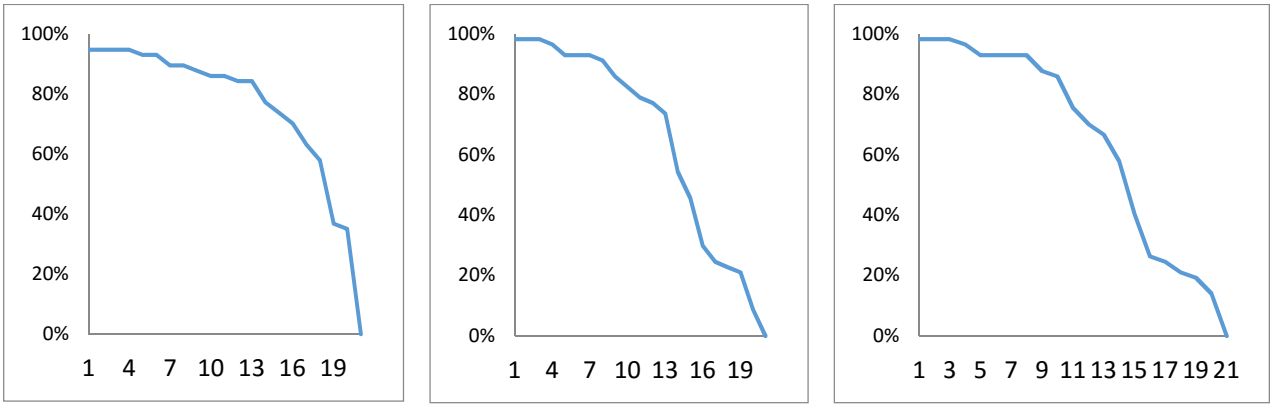


Figure B.4 - Inverse distribution function of switching point for discount rate in session 2

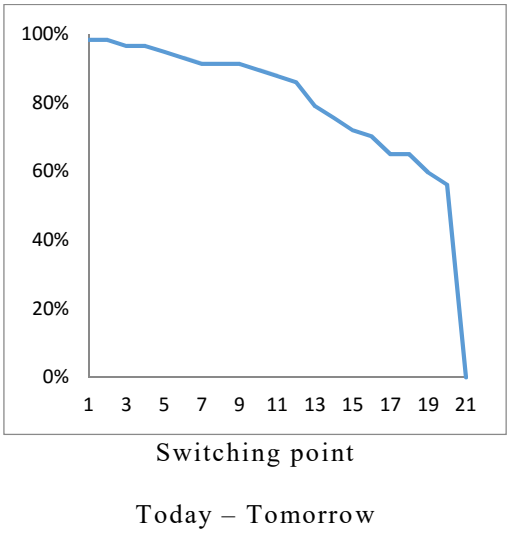
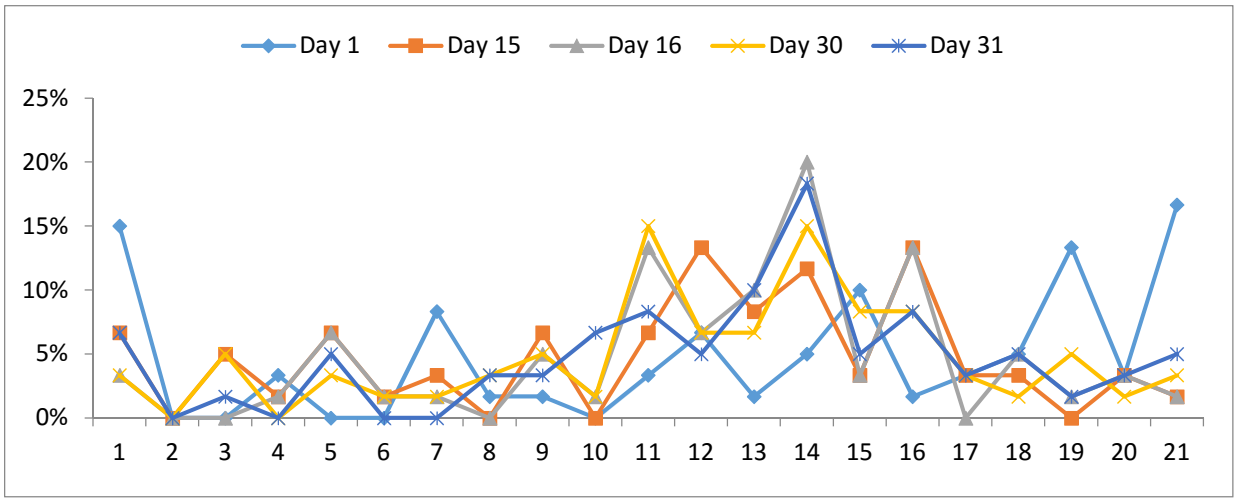
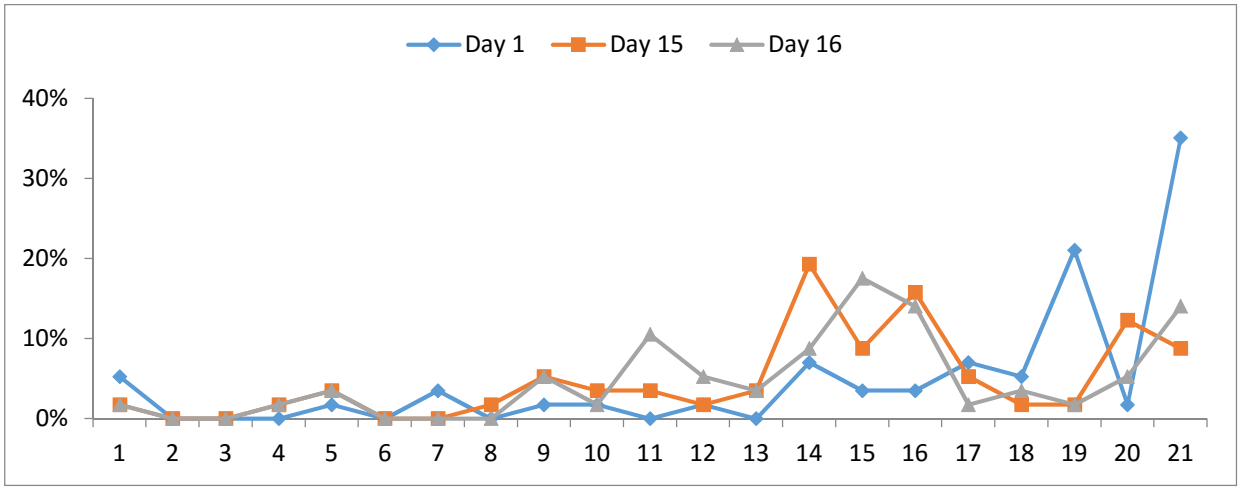


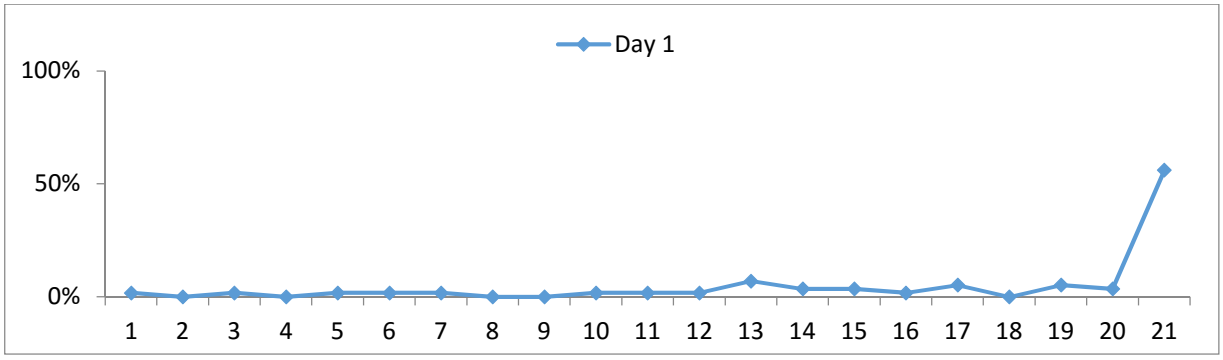
Figure B.5 - Inverse distribution function of switching point for discount rate in session 3



Session 1

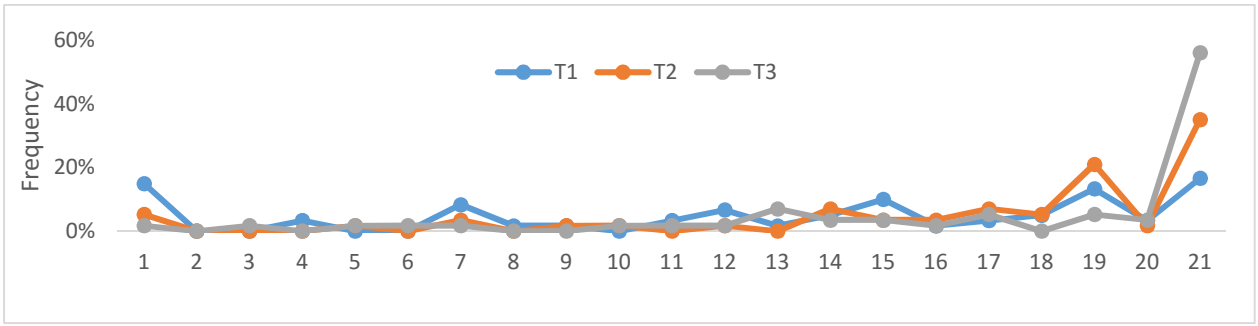


Session 2

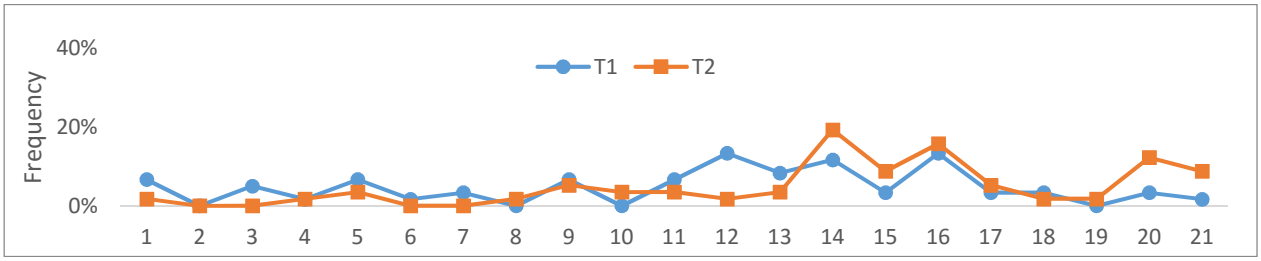


Session 3

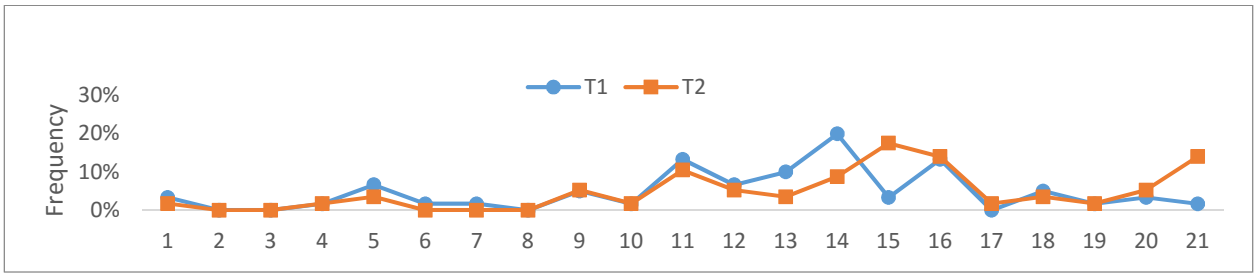
Figure B.6 - Distribution function of switching point for discount rate in each session



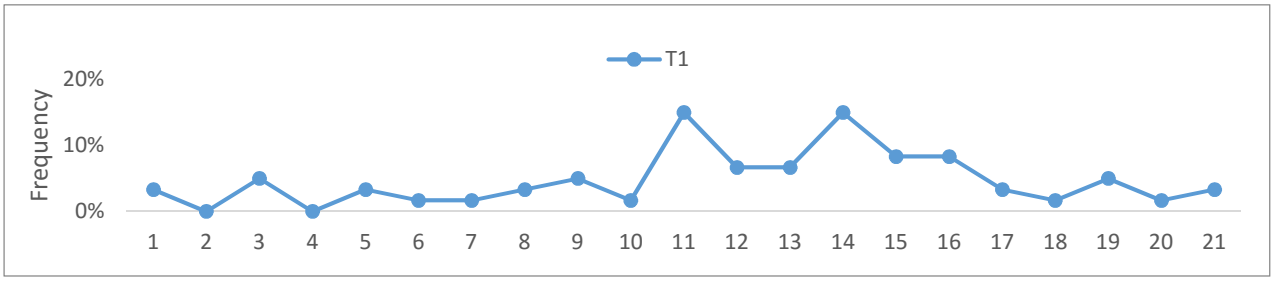
Day 1



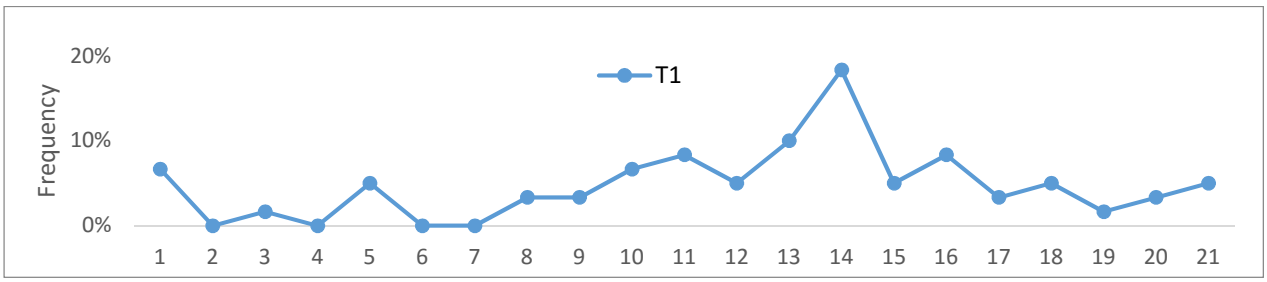
Day 15



Day 16



Day 30



Day 31

Figure B.7 - Distribution of switching point for discount rate for each time horizon

Dependent Variable: equals 1 if an individual show at least one form of choice reversal; and equals zero, otherwise.

Model	*(1)*	*(2)*	*(3)*	*(4)*
Anticipatory feelings	.418**	.444*	.378	.496**
(A dummy for each session)	(.236)	(.239)	(.238)	(.248)
Mean Discount Rate		-.002**		-.002**
		(.0009)		(.001)
Risk Aversion			.134	.239
(A scaler for each session)			(.238)	(.256)
Satiation				.310
				(.240)
Gender				.283
				(.208)
Region				.202
				(.216)
Constant	.083	.376**	.095	.305
	(.108)	(.171)	(.132)	(.211)
N	174	174	171	171
Pseudo R^2	0.0135	0.0341	0.0119	0.0561
Log likelihood	-117.347	-114.890	-113.275	-108.20

Notes: *Probit* estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table B.1 - probit regression outcome

Appendix C

C.A. Instruction of experiment

Universität Trier

Terms and Conditions:

Each session will be saved on the computer and interruptions of the game can be tracked. In order to keep our results true and genuine you will automatically agree to and follow the following terms and conditions, as well as all other instructions given, when filling out this questionnaire.

- Please answer all questions faithfully and to the best of your knowledge.
- Please do not open any other windows, tabs, or programs during the entire experiment.
- The entire program is operated exclusively with the mouse. You do not need or touch keyboard.
- Please do not look at other participants' questionnaires or monitors.
- Please shut down your mobile phone for the duration of the experiment and avoid loud noises or anything that could disturb others.
- Hereby we want to point out again that a breach of the terms and conditions or the referee's instructions automatically results in an exclusion from the experiment. In such a case there will be no reward for participation. We thank you for your understanding.
- All ECU (Experimental Currency Units) expire at the end of the experiment.

The Game:

- Each player plays 6 rounds.
- For each round each participant receives a fixed payment of 500 ECU.
- Each round lasts 5 minutes.
- The participant can shorten the duration of each round through spending ECU.
- During each round there is the possibility to encounter a loss event with a probability of $1/3$, at which the participant loses 1000 ECU.
- When you go bankrupt, you will have to wait an additional 5 minutes. At the beginning of the next round your balance will be set to zero again. You do not receive a payment for this round.

Questionnaire

I. Demographics

01	Please write down your participant ID: (verify with the monitor) _____

02	Please indicate your gender: Male ☐ Female ☐

03	Please write down your age: _____

04	Please write down what you are studying (college/major): _____

II. Self-evaluation of your savings and investment behavior

05	I feel uncomfortable when I do not have any savings for bad times. Does not apply … Applies --1-- --2-- --3-- --4-- --5--
06	It is indispensible for me to take care of my financial future. Does not apply … Applies --1-- --2-- --3-- --4-- --5--
07	I spend money when I am unhappy or frustrated. Does not apply … Applies --1-- --2-- --3-- --4-- --5--
08	Special offers lure me to buy products. Does not apply … Applies --1-- --2-- --3-- --4-- --5--
09	I rather enjoy spending than saving money. Does not apply … Applies --1-- --2-- --3-- --4-- --5--

III. Competitive behavior

10	I try to avoid competitions with others. Does not apply Applies **--1--** **--2--** **--3--** **--4--** **--5--** ☐ ☐ ☐ ☐ ☐

11	I feel uncomfortable in situations with competition. Does not apply Applies **--1--** **--2--** **--3--** **--4--** **--5--** ☐ ☐ ☐ ☐ ☐

12	I avoid conflicts by subordinating myself within a group. Does not apply Applies **--1--** **--2--** **--3--** **--4--** **--5--** ☐ ☐ ☐ ☐ ☐

13	I often try to outperform others. Does not apply Applies **--1--** **--2--** **--3--** **--4--** **--5--** ☐ ☐ ☐ ☐ ☐

14	I like it to participate in competitions. Does not apply Applies **--1--** **--2--** **--3--** **--4--** **--5--** ☐ ☐ ☐ ☐ ☐

IV. Risk attitude and time preferences

15	Are you generally a risk seeking person or do you try to avoid risk? Risk averse Risk seeking **--1--** **--2--** **--3--** **--4--** **--5--** **--6--** **--7--** **--8--** **--9--** **--10--** ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

16	In financial decisions, are you generally risk seeking or do you try to avoid risk? Risk averse Risk seeking **--1--** **--2--** **--3--** **--4--** **--5--** **--6--** **--7--** **--8--** **--9--** **--10--** ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

17	Assume you win 10.000$ in a lottery. You can buy many pleasant things (clothes, computer, furniture, car etc.) with these or you can save some of the money. What part of the money would you spend and what part would you save? Save _____ dollars. Spend _____ dollars.

18	What alternative would you prefer? A: A payment of $1,700 in this month. ☐ B: A payment of $1,900 in the next month. ☐

19	What alternative would you prefer? A: A payment of $2,200 in this month. ☐ B: A payment of $2,300 in the next month. ☐

20	In the following lottery you have a 50% chance to win or lose a certain amount of money. The loss is predetermined. Please indicate the minimum payment in case of a gain at which you would accept the lottery. Outcome 1: 50% probability to lose $50 Outcome 2: 50% probability to gain $_____ (please indicate)

21	Please consider the following alternatives and indicate what the least amount X must be in order to make both alternatives equally attractive for you: A: A payment of $ 100 **now**. B: A payment of $ X **in a year**. *X* must amount to at least $ _____ , so B will be as attractive to me as A.

22	Please consider the following alternatives and indicate what the least amount X must be in order to make both alternatives equally attractive for you: A: A payment of $ 100 **now**. B: A payment of $ X **in 10 years**. *X* must amount to at least $ _____ , so B will be as attractive to me as A.

V. Happiness

23	How happy are you at this moment? Very unhappy Very happy **--1--** **--2--** **--3--** **--4--** **--5--** **--6--** **--7--** **--8--** **--9--** **--10--** ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

24	How happy are you overall considering your current living situation/environment? Very unhappy Very happy **--1--** **--2--** **--3--** **--4--** **--5--** **--6--** **--7--** **--8--** **--9--** **--10--** ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

C.B. Screenshots of the game

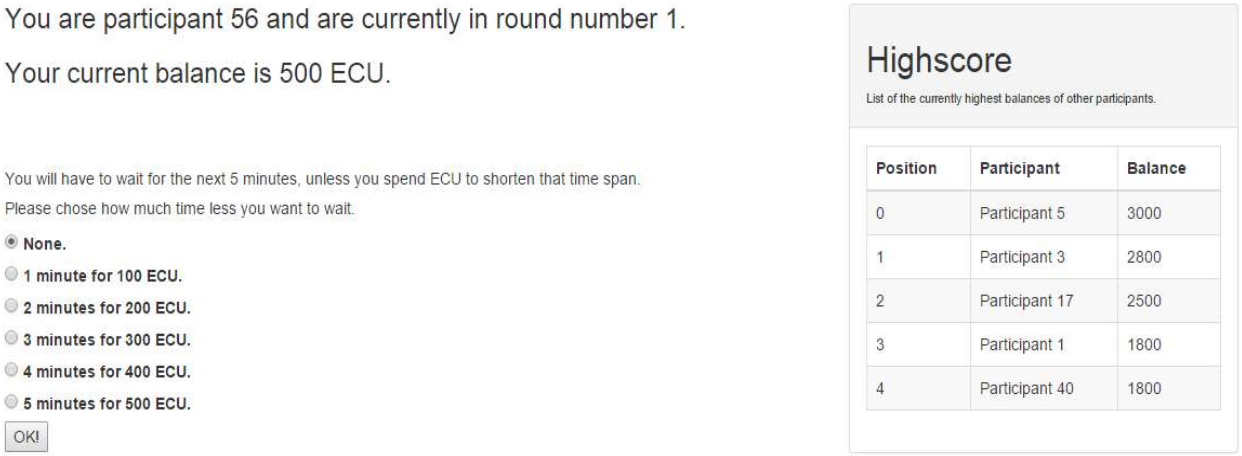


Figure C.1 - Screenshot of the game interface with a high score display

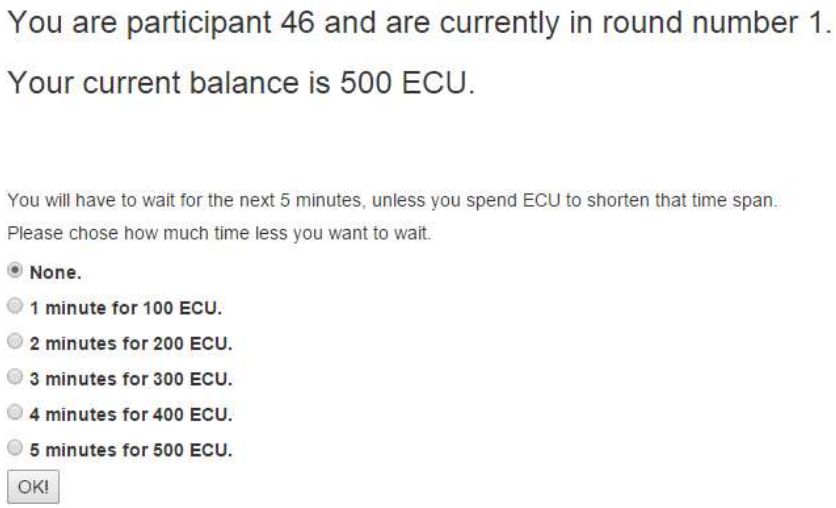


Figure C.2 - Screenshot of the game interface without a high score display

C.C. List of variables

Variable	Description
High score	Dummy variable that describes whether the experiment is played with or without a high score on screen.
Country	Location of the experiment, or respectively nationality of the participant.
Female	Dummy variable that equals 1 in case the participant is a woman, zero otherwise.
Round	Dummy variable for the current round that is being played.
Wealth at begin of round	Wealth variable for the beginning balance of each round (after receiving income).
Spend	The amount spent per round.
Save	The amount saved per round.
H_t^B	Happiness level before the loss event.
Loss event	Dummy variable that equals 1 if the participant had a loss event in the current round, 0 otherwise.
Loss before	Dummy variable that equals 1 if the participant had a loss event in the preceding round, 0 otherwise.
H_t^A	Happiness level after the loss event.
Bankruptcy before	Dummy variable that equals 1 if the participant went bankrupt in the round before. There is no income paid in the current round.
Saver	Factor saver from a factor analysis.
Spender	Factor spender from a factor analysis.
Competitiveness	Shows whether the participant likes competitive situations/ competitions (on a scale from 1 - 5).
Patient	Shows how patient the participant is regarding financial decisions (on a scale from 1 - 3).
Loss aversion	Measures the participant's loss aversion (Minimum acceptable lottery gain divided b 50).
Present Bias	The present bias is beta from the hyperbolic discounting model.
Had bankruptcy	Dummy variable that equals 1 if the participant had a bankruptcy throughout the experiment, 0 otherwise.
Had loss event	Dummy variable that equals 1 if the participant had a loss event throughout the experiment, 0 otherwise.
Bankruptcy danger	Dummy variable that equals 1 if the participant was in danger of bankruptcy in the current round (wealth < 1,000 ECU), 0 otherwise.

Totally Secure	Dummy variable that equals 1 if the participant's wealth is large enough so there is no chance of going bankrupt within the experiment anymore, 0 otherwise.
Unlucky	Dummy variable that equals 1 if the loss event occurred in more than 1/3 of the rounds played, 0 otherwise.
Financial risk aversion	Shows how risk averse the participant is in regard to financial decisions (on a scale from 1 - 10, where 1 is a pure risk seeker)
Risk aversion	Shows how risk averse the participant is in general (on a scale from 1 - 10, where 1 is a pure risk seeker)

Table C.1 - List of variables

C.D. Additional Regressions and Tables

Dependent V.	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B
Model	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Save	.001		.001***	-.0005		.0012***	-.0004
	(.0001)		(.0003)	(.0006)		(.0001)	(.0005)
Risk aversion		.169***	.188***	.151			
		(.043)	(.061)	(.0637)			
Save x Risk aversion			-.00008	-.00002*			
			(.00006)	(.00005)			
Loss aversion					.00005	.0001	.00014***
					(.00003)	(.00004)	(.000042)
Save x Loss aversion						-.00008	-.00008
						(.00005)	(.00005)
Control V.							
Round				-.376***			-.375***
				(.109)			(.109)
Wealth at begin of round				.001***			.001***
				(.0006)			(.0006)
Loss before				-.263			-.207
				(.350)			(.350)
Bankruptcy before				-1.26***			-1.34***
				(.420)			(.420)
Had bankruptcy				.368			.351
				(.287)			(.287)
Had loss event				.121			.108
				(.319)			(.322)
Totally secure				-.440			-.434
				(.313)			(.312)
Bankruptcy danger				.196			.197
				(.325)			(.325)
Female				0991			.156
				(.185)			(.185)
Unlucky				-.464			-.575*
				(.240)			(.243)
Constant	5.84***	5.81***	4.914***	6.31***	6.65***	5.76***	7.02***
	(.132)	(.238)	(.333)	(.747)	(.0967)	(.135)	(.661)
N	630	630	630	630	630	630	630
R^2	0.105	0.0241	0.121	0.296	0.003	0.114	0.298

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table C.2 - Actual saving and happiness for individuals with different financial attitude

Dependent V.	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B	H_t^B
Model	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Save	.001 (.0001)		.001*** (.00001)	-.0007 (.0005)		.008*** (.0003)	-.0008 (.0006)
Present bias		.000004** (.0000002)	.000002 (.0000001)	.000002 (.0000004)			
Save x Present bias			-.000008 (.000006)	-.000003 (.000001)			
Patient					. -.044 (.098)	. -.117 (.137)	. -.055 (.144)
Save x Patient						.0001 (..0001)	.0001 (.0001)
Control V.							
Round				-.383*** (.110)			-.376*** (.110)
Wealth at begin of round				.002*** (.0006)			.001*** (.0006)
Loss before				-.238 (.352)			-.249 (.350)
Bankruptcy before				-1.26*** (.422)			-1.24*** (.425)
Had bankruptcy				.250 (.251)			.296 (.290)
Had loss event				.088 (.321)			.105 (.322)
Totally secure				-.428 (.314)			-.412 (.315)
Bankruptcy danger				.256 (.327)			.235 (.325)
Female				.159 (.187)			.129 (.187)
Unlucky				-.419 (.242)			-.447* (.242)
Constant	5.84*** (.132)	6.644 *** (.095)	5.84*** (.132)	7.07*** (.747)	6.78*** (.243)	6.10*** (.338)	7.16*** (.738)
N	630	630	630	630	630	630	630
R^2	0.105	0.0096	0.108	0.287	0.003	0.107	0.284

Notes: OLS panel estimation
*,**,*** measures statistical significance at the 10, 5 and 1% levels respectively

Table C.3 - Actual saving and happiness for individuals with different financial attitude

	GER	*USA*
Mean	0.54	0,40
Variance	0.39	0.10
Observations	50	55
Hypothesized Mean Difference	0	
df	72	
t Stat	1.40	
P(T<=t) one-tail	0.08	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.17	
t Critical two-tail	1.99	

Table C.4 - Test for difference in beta for GER and USA at a 5% level

	USA	*GER*
Mean	0.84	0.82
Variance	0.02	0.01
Observations	55	50
Hypothesized Mean Difference	0	
df	98	
t Stat	0.35	
P(T<=t) one-tail	0.36	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.72	
t Critical two-tail	1.98	

Table C.5 - Test for difference in delta for GER and USA at a 5% level

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