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The Effect of the Past- and Future Self and Past- and Future Awareness on Intertemporal Decision Making

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Abstract

Consumers often make intertemporal choices; decisions that involve potential future pay-offs at different points in time. Potential future outcomes are not evaluated and considered properly which leads to decisions that in the future seem not as optimal as from an earlier point of view. People are hyperbolic discounters, meaning that when the time interval lies further ahead in the future, their discount rate for monetary gains in the future decreases. The sensitivity towards future time intervals can be influenced. People who are more aware of the future have lower personal discount rates. To what extent people discount the future when they are more nostalgic has been unknown, as well as to what level this nostalgia proneness and its effect on discounting can be enhanced. During an experiment among 121 students of Erasmus University Rotterdam several manipulations were done to test these effects. The results showed that when a person is manipulated towards the future his personal discount rate decreases for monetary values in the far future. Higher awareness of the future in combination with priming the future through a manipulation leads to better discounting of monetary gains for the upcoming months. More nostalgic individuals have on average a higher discount rate when evaluating future values. Evidence was found that the level of nostalgia proneness could be enhanced through manipulation and therefore it does influence time discounting. Except these few cases, further evidence that past manipulated groups discount future values different from the future manipulated group was not found. Further research still has to develop a manipulation to enhance nostalgia proneness and to see if there is any effect on time discounting. Therefore, and to improve on the manipulations this research used, further research could try other sorts of dependent variables and manipulations. The dependent variables should be more specific to a certain time interval, with the same starting- and end-date and across more different time intervals. The exact personal discount rate should be calculated to gain more precise results. Manipulations should be more specific to a certain individual and more specific to the certain time interval that is to be tested for time discounting.

1. Introduction

People who only think of the present do not make rational choices about the future. People are hyperbolic discounters. This means the discount rate over different time intervals is inconsistent over time and declines when the interval lies more in the future. It seems like people are earlier satisfied with a certain amount of return when the choice has to be made further ahead in the future. When choices have to be made in the present consumers tend to demand higher return than with choices to be made about the future.

Consumers make trade-offs between spending money and saving for the future. Products that are bought now can be paid back in the future. Decisions about how much money to put aside for retirement and the repayment of the mortgage are also affected. Health- and environment related decisions are also decisions under pressure of intertemporal decision making. People exercise to lose weight and to remain healthy in the future. People make trade-offs between the benefits of smoking now and the cost of the chance to get sick in the future. Some sunbathers use a high sun protecting factor to reduce their chance on skin cancer and wrinkles in the future, while others do not use sunscreen to get a more tanned skin in the short run.

Recent research has shown that future self-continuity (i.e. awareness of the future time interval) increases the ability to discount future values. This research has focused on the future-self, but some people have a tendency to look at the past, i.e. they are nostalgic. This research is aiming to investigate how people with a high attitude to looking at the past perceive their future self. It might be that people who are more nostalgic are also more adequate time discounters. They are more conscious of the time interval towards the past, so they might also be more conscious of the time interval towards the future. It can also be that people that are more oriented towards the past are less thinking about the future and are less adequate discounters. This research will try to investigate if there is any relation between nostalgia and awareness of the future and if there exists a way to influence or enhance time discounting for nostalgic people.

If the theory holds that nostalgic people are more adequate discounters and their discounting manner can be enhanced, it will not only be beneficiary for companies but for consumers as well. When companies have to make decisions about the future, an implication can be to first look at the history of the company and to look how history-oriented the business is. Consumers, who tend to make inadequate decisions about health or investments,

can be made more salient about the future time interval to let them make more adequate decisions.

In the next section the theoretical framework of this research is constructed. Concepts and relations about time discounting, future awareness and nostalgia will be illustrated according to empirical evidence. The aim of this research together with the research questions will be explained. Then the hypotheses to test the research questions are formulated with the dependent and independent variables to be examined. The experiment that is hold and the method that is used to answer the research questions is explained in the section 'Methodology'. The findings of the research will be presented in the 'Results'. Discussion and conclusions are offered next. Furthermore, the managerial implications are also discussed.

2. Theoretical framework

In this research the influence of the level of awareness of the future and the level of nostalgia of consumers on the time discounting manner is examined. In the following paragraphs the concepts of 'time discounting', 'self-control' and 'awareness of the future' and 'nostalgia' will be explained, including their underlying (expected) relation with each other. The concepts will be introduced by a critical review of current research in these fields. Gaps will be identified where this research will contribute to and the research questions will be stated accordingly.

2.1 Time discounting

'Discounting, in its most general meaning, is the lowering of the value of an object, good or prospect for a specific and separate reason. Time discounting refers to the practice of weighing the goodness of prospect with the time of its occurrence. More specifically, after evaluating the goodness of a temporally extended prospect, it is then weighted by the temporal distance between the present and when its temporal parts occur' (Heilmann, 2008, p.3.).

Time discounting can be applied to the expected utility theory, where the expected discount rate of a person can be calculated. The discounted utility model, which has been introduced by Samuelson in 1937, has dominated economic analyses of intertemporal decision making ever since. According to the discounted utility model, people who make rational choices about the future use economic discounting. With the economic discounted utility model the discount rate is constant over different time intervals. Then people give the

same values to different amounts of money over different time intervals. For example, when someone chooses two apples tomorrow over one apple today, will also choose two apples in 101 days over one apple in 100 days.

The economic discounted utility function (equation 1), as developed by Samuelson (1937), is assumed to be linear in the most optimal situation (i.e. the discount rate is constant over time).

Equation 1: Discounted Utility Function

$$DUF_{i,t} = \sum_{t=0}^{T} \frac{\text{Money amount}_{i,t}}{(1+d)^t}$$

Where:

DUF = the discounted utility function

d = the discount rate in percentage

t = the amount of time (in years) from now

i = a certain individual

In spite of the widespread use of the discounted utility model, empirical evidence shows that discount rates are not constant but decrease when the time interval lies further ahead in the future. That is, future events are discounted according to a hyperbolic discounted utility function (e.g. Frederick et al., 2002). The phenomenon is also known as decreasing impatience. Kirby an Marakovic (1995), compared hyperbolic and exponential (where the discount rate is assumed to be constant as with the theory of Samuelson) discounting functions, but hyperbolic discounting better described their data. According to the research of Kirby and Marakovic (1995), the valuation of a future reward decreases as the delay of receiving the reward increases, but the valuation of a future reward increases as the size of reward increases. They found that people prefer larger later rewards over smaller earlier rewards, but choose the smaller reward as it approaches in time. Then a reversal of preference occurs which can be described as the *impulsive* choice of a person. For example, someone who chooses initially two apples in eight days over one apple in seven days is likely to reverse that preference one week later and chooses the one apple immediately instead of two apples the next day.

Certain anomalies of discounting utilities were also found by Loewenstein and Prelec (1992). The anomalies explain why the assumption of linearity of the discount rate does not hold. The anomalies should be taken into account when using the discounted utility model. The anomalies contain important psychological factors, which influence intertemporal choice. The first anomaly is the so called *'common difference effect'*, which states that people show dynamically inconsistent behavior over time. It also implies decreasing discount rates over time. The second anomaly which has been found is *'The absolute magnitude effect',* which means that large money amounts suffer less proportional discounting than smaller ones. Evidence was found that subjects who were on average indifferent between receiving 15 euro now or 60 euro in a year were also indifferent between receiving 3000 euro now or 4000 euro in a year. The third anomaly, *'the gain/loss asymmetry'*, claims that losses are discounted at a lower discount rate than gains. Abdellaoui et al. (2006) studied the slope of the utility function of the discounted utility model. They found that the utility for gains is concave and the utility for losses slightly convex. The fourth anomaly, *'the delay-speedup asymmetry'*, shows an asymmetric preference for speeding up and delaying a consumption. The amount of money willing to sacrifice by consumers to speed up consumption was two to four times bigger than the amount of reward they would want to compensate for a delayed consumption. The discount rate also depends on the type of product and prospect to be discounted. For example, hunger, thirst and sexual desire are discounted at higher rates and when individuals come in direct sensory contact with a choice object they have higher discount rates (Loewenstein and Prelec, 1992).

As mentioned in the introduction, the time discounting manner, which will be de dependent variable in this research, can be influenced and enhanced through certain manipulations (Ebert, Prelec, 2007). It was also found that there are differences in the level of hyperbolic discounting (Nenkov et. al., 2007), due to personal differences in the level of self-regulation, as will be explained in the following section. This research responds to this by examining if certain person related characteristics explain differences in the accuracy of discounting future values and if certain manipulations can influence the discounting technique. These person related characteristics are explained in the following paragraphs and are simultaneously the independent variables in this research. See also the research questions 1 and 3 in section 3.2.2 and 3.3.3).

2.2 Self-control and awareness of the future

As already explained in the former section it is widely known that people are hyperbolic discounters (i.a. Zauberman et. al., 2009). Baumeister and Heatherton (1996) show that this is because people fail to exert *self-control* (i.e. a person does not care or does not manage to control the self). Individuals differ in their cognitive ability of self-regulation. Nenkov et al. (2007) found a way to measure the level of self-regulation of an individual and found that some people are more effective in self-regulation than others. They state that consumers differ in their way of *evaluating potential outcomes* due to a decision.

Loewenstein and Prelec (1992) explain that the time preferences of a person can change over time, but a person may not be aware of this inconsistency. On one hand a person can be complete 'naïve' and believe that his future preferences will be exactly the same as they are now. On the other hand a person could be completely 'sophisticated' and predict correctly the change his preferences will make. People are somewhere in between those extremes. O'Donoghue and Rabin (2001) show that there can also exist 'partial naïvité', where a person is aware of his future self-control problems, but underestimates the magnitude of it.

When people are inclined to go for short term benefits, (e.g. impulsive choices or impulse buying), marketing managers can effectively anticipate upon this (Baumeister, 2002). Managers can offer services that anticipate on the inadequate discounting manner of consumers. Failure of optimal decision making regarding purchases may lead to higher profits for companies but more unsatisfied and unhappy consumers once they realize later on their decision was not as optimal as from an earlier point of view.

2.2.1 Causes for the lack of self-control

In attitude formation theory, the Elaboration Likelihood Model (ELM) from Petty and Caccioppo (1983) have analyzed the way consumers elaborate information. Both motivation and ability factors determine the accuracy of elaboration of information. The *motivation* to think about the future depends on the level of involvement with the subject to be decided on. It also depends on the level of *involvement* they have with the issue that has to be decided on. *Personal relevance* or importance of the subject to be decided on plays a role in the level of involvement. When personal relevance is higher, people are more motivated to think. So it could be that for some subjects people take the future consequences into account and make adequate decisions, while for other subjects they do not. The *complexity* of the problem as

well as the *experience* a person has with solving problems plays a role in the *ability* to solve the problem. Furthermore, people's actions also on *the outcome* they expect to result from a certain behavior and *the likelihood* that the desired outcome will occur (Bandura, 1997). According to Bandura (1997), it is the belief of a person in his ability to execute certain behaviors. It influences the level of effort they spend and their perseverance when facing difficulties.

Baumeister and Heatherton (1996) give another explanation for the lack of self-control. To regulate the self a person should be able to transcend the immediate situation by considering long-term consequences. When transcendence is weak, the control over the self becomes weaker. Circumstances play a role, when stress or fatigue is depleting an individuals' strength, self-regulatory failure becomes more likely (Baumeister, 1996). According to Baumeister, people lose control of their own decisions because they have conflicting goals in their life or because they simply fail to keep track of their own behavior. For example, the goal of feeling better immediately conflicts with the goal of saving money. Another example that research has shown, is that heavy social drinkers and problem drinkers were less future-oriented (Vuchinich and Simpson, 2000).

Hoch and Loewenstein (1991) explain why people sometimes act against their own judgment and make decisions that are regretted afterwards. According to them, self-control consists of *desire* and *willpower* which are two independent psychological factors. A change in the level of desire or willpower of a consumer can shift them over the line to buy products.

2.2.2 Self-control and awareness of the future

Even though the future discounting manner of people is inadequate because of the lack of self-control and they are insufficiently sensitive to the temporal dimension, research also shows that this sensitivity to time dimension can be *fragile*. This fragility means that certain manipulations can easily enhance their way of discounting. In experimental manipulations the sensitivity people have towards the future has been influenced and enhanced. The results claimed that when people are given more information, more time, a visual cue and are paying more attention, their valuations of a future object were improved (Ebert, Prelec, 2007). Baumeister and Heatherton (1996) also show when attention to the future goals is attracted, the capacity of self-regulation tends to improve.

Awareness of the future is associated with valuing future rewards, i.e. it indicates lower rates of temporal discounting. Increased awareness of the future self is related to, for

example, saving money for the future (Ersner-Hershfield, Garton, Ballard, Samanez-Larkin and Knutson, 2009). However, a causal relation between future self-awareness and saving was not specified in the research. When duration of the time interval of the future is made more salient and accessible (i.e. duration of events in different time intervals were primed), consumers were more sensitive to time horizon and the degree of hyperbolic discounting was attenuated (Zauberman, Kyu Kim, Malkoc and Bettman, 2009). The forthcoming paper of Bartels and Urminsky was the first to find a causal relation between a person's sense of connectedness to their own later self and making better intertemporal choices.

In this research an attempt is made to examine the influence of the level of awareness of the future on the time discounting manner. This raises the next two research questions:

1. *What is the impact of a higher baseline future awareness on discounting future values?*

This question addresses to the differences that can exist between persons. When a person is more conscious of his future self he/she is expected to discount more adequately. At the same time, the question raises how to improve on the awareness of the future self and if there is a manner that can influence and enhance discounting. This leads to the following research question:

2. *What impact will a confrontation with the future have on evaluating decisions about the future?*

2.3 Nostalgia

2.3.1 Definition

In history 'nostalgia' originally meant '*a painful yearning to return home*'. In empirical research nostalgia is defined as '*a longing to the past, a yearning for yesterday, or a fondness for possessions and activities associated with the past*'. Davis (1979) views it also as a positively toned evocation of a lived past. The memory may not even reflect the reality of the past but may be reflecting a more positive picture (Holbrook, 1993, p. 245)

Holbrook and Schindler (1991) define nostalgia as follows '*a preference (general liking, positive attitude, or favorable effect) toward objects (people, places or things) that were more common (popular, fashionable or widely circulated) when one was younger (in early adulthood, in adolescence, in childhood or even before birth)*' (p. 331).

Belk (1990) defines it as '*a wishful mood that may be prompted by one object, a scene, a smell or a strain of music'* (p. 670).

According to Holak and Havlena (1998) nostalgia is stated as '*a positively balanced complex feeling, emotion, or mood produced by reflection on things (objects, persons, experiences, ideas) associated with the past'* (p. 218).

Holak and Havlena (1998) found that nostalgia brings both positive as negative feelings. Positive feelings are for example warmth, joy, gratitude, affection and innocence. These were linked with family, friends and social occasions. Negative feelings are sadness and desire. Another negative feeling is the sense of 'loss' of the past which one cannot retrieve.

2.3.2 Nostalgia Proneness

The level of proneness to nostalgia is peaking when people become middle aged and during retirement. Consumers tend to form enduring preferences during sensitive periods in their lives. Their attitude towards the past seems to influence this tendency (Holbrook and Schindler, 1994). They also found that nostalgic emotions are strongest towards periods in early adulthood and adolescence and on average men are more nostalgic than women. Not only time, age and gender play a role in nostalgia proneness, but also psychographic differences (Holbrook, 1993). Holak and Havlena (1998) found that 'dominance' has a negative correlation with the level of nostalgia – this can be explained by the fact that people who are dominant feel powerless when returning to the past. 'Pleasure' has a positive correlation with nostalgia proneness, which reflects to the positive experience nostalgia brings for persons (Holak and Havlena, 1998). Holak and Havlena (1991) state that marketing managers can anticipate on the tendency of consumers to feel nostalgic emotions more strongly during certain periods in life (like the senior market or baby-boomers) by offering products with a link to the past. These products must limit the sense of loss by recapturing the original feeling.

2.3.3 Nostalgia and future awareness

Although it is still in its infancy, research has already touched upon making time interval more salient to people to enhance their way of valuing pay-offs in the future. But former research has not linked the level of being nostalgic to their time discounting manner. This current study will try to contribute to this by investigating how people who tend to look at the past make intertemporal choices. It might be that people who are more nostalgic are also more

adequate time discounters. They are more conscious of the time interval towards the past, so they might also be more conscious of the time interval towards the future. It can also be that people that are more oriented towards the past are less thinking about the future and are less adequate discounters. It is not known if there is any relation at all between nostalgia and awareness of the future. In this research the level of nostalgia respondents will be measured and whether these differences between the respondents do have a relation with the level of accuracy of discounting future values.

Johnson and Sherman (1990) explain that when the past is remembered presently and decisions for the future are anticipated presently, the lessons people learned from the past could be transferred to decisions for the future. Sedikides et. al. (2008) state that nostalgia may facilitate a feeling of continuity between past- and present selves. The positive perceptions about the past can bolster a sense of continuity and meaning in one's life.

As stated before nostalgia has been associated with as well positive as negative feelings. 'Pleasure', was positively correlated with the level of nostalgia. The positive associations of nostalgia can have a motivating potential, it can boost optimism, spark inspiration and foster creativity (Sedikides et. al., 2008). On the other hand, more dominant people do not like to look back because they will lose power. Nostalgia may induce that people are more fixated on 'the better old days' and then it may limit or prevent motivation to think of the present or the future (Sedikides et. al., 2008). Newby-Clark and Ross (2003), propose people are more optimistic towards future events. They might not consider all the negative consequences that can occur and therefore make less adequate decisions prior to future events.

It is not known if nostalgia has an effect on discounting future values. According to the data of this research will be decided if there is an effect and if nostalgia has a positive or negative influence on making decisions for the future. This raises the following question:

3. *What is the impact of higher baseline nostalgia proneness on discounting future values?*

At the same time the question raises, if there exists sensitivity for nostalgic people towards the future, can this sensitivity be intensified. Davis (1990) states that people can readily and easily recall negative as well as positive episodes from their lives. It can be that when people are confronted with their past, their baseline level of nostalgia increases and through that their

sensitivity towards future events may be strengthened. This leads to the following research questions:

4. *What impact will a confrontation with the past have on evaluating decisions about the future?*

3. Hypotheses

There exists evidence of a link between 'being aware of the future' and hyperbolic discounting. The more aware a person is about the future, the better (or less hyperbolic) his or her manner of discounting becomes. The baseline level of awareness of the future an individual has and their discounting manner will be examined. A positive relation will be expected from the level of awareness of the future and the ability to discount future values. The first hypothesis becomes:

H1: When individuals have a higher baseline level of awareness of their future, individuals' discount rate decreases.

Zauberman et al. (2009) show that certain manipulations can enhance the way of discounting. This research tries to enhance the awareness a person has on his future. In an experiment a manipulation will trigger an individual to consider the future. With that it will trigger the person to make more adequate decisions while evaluating future consequences. This leads to the following hypothesis:

H2: When confronted with their future, individuals' discount rate decreases.

A lower discount rate implicates a higher outcome of the future value. When the value of a certain (money or utility) amount becomes higher due to a lower discount rate, it has a higher weigh in the decision. Future consequences are then taken more into consideration when decisions have to be made for the future.

To test the research questions according to the variable nostalgia, the following hypothesis are constructed. As already explained in the conceptual framework, the theory states that nostalgic people might not like to look forward. Therefore it is expected that they do not take future values into consideration as should be. The discount rate for nostalgic people is expected to be higher. To test this the baseline level of nostalgia proneness and its impact on time discounting will be examined. The third hypothesis becomes:

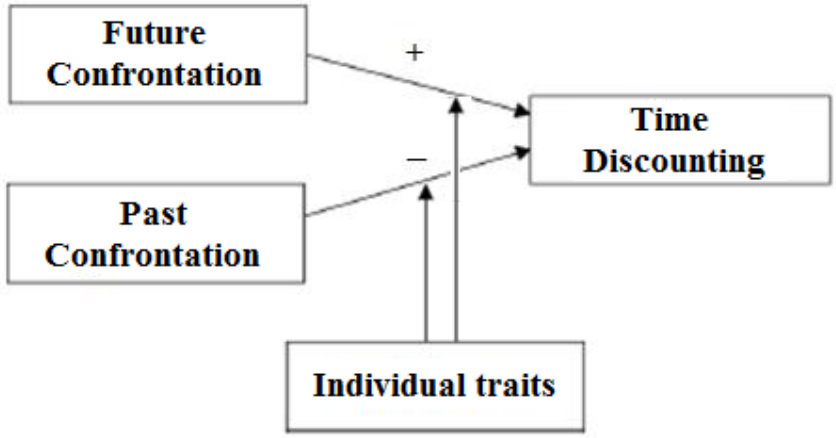
H3: When individuals have a higher baseline level of nostalgia proneness, individuals' discount rate increases.

Just as with the second hypothesis for the confrontation with future, this research tries to examine if a confrontation with the past intensifies the effect of the baseline level of nostalgia on taking future consequences into consideration when decisions have to be made for the future (i.e. if the level of nostalgia and its influence on time discounting can be enhanced). This leads to the fourth hypothesis.

H4: When confronted with their past, individuals' discount rate increases.

The different hypotheses are visualized in Figure 1, with their expected directions between the independent- , moderator- and dependent variables.

Figure 1: The Theoretical framework



The independent variables are the manipulations towards a certain time interval; *'Future Confrontation'* and the *'Past Confrontation'*. *'Individual traits'* function as the moderators which include 'the baseline level of future awareness' and 'the baseline level of nostalgia proneness'. The dependent variable is *'Time Discounting'*. *'Future Confrontation'* is expected to have a positive causal relation with *'Time Discounting'* (i.e. a person who is more focused on the future self, is expected to discount more properly). The *individual trait* 'baseline level of future awareness' is expected to have a positive causal relation with *'Time Discounting'*. Although it is not clear from former research, *'Past Confrontation'*, is expected to have a negative causal relation with the manner of *'Time Discounting'*. The *individual trait* 'baseline

level nostalgia proneness' is expected to have a negative causal relation with *'Time Discounting'*.

4. Methodology

4.1 The discounted utility model

In this research the accuracy in discounting over different time intervals is tested. The dependent variable in this research is 'Time discounting'. According to the theory of Samuelson, as already explained in the 'Theoretical Framework', the more constant the discount rate is kept across different time intervals, the more accurate the discounting is (i.e. the discount rate then approaches economic discounting).

However people do not have constant discount rates over time. Other researchers show that the discount utility function is inconsistent (e.g. the discount rate changes for different amounts of rewards, for gains the utility function is different than for losses etc.) As a result, alternative utility models of intertemporal choice have been developed that all add up different arguments for intertemporal decision making. Therefore, one single average discount rate cannot be computed for a person. The discounted utility function can only be calculated when all temporal profiles have the same unit of time and have common final periods (Abdellaoui et. al., 2006). Another option, to calculate the average discount rate, is to let the person decide what his average discount rate is. This can be done by letting them decide the amount of money they want to have compensated for waiting a certain time period to receive a certain amount of money. Though, the results could be biased because people do not know how much they want to have compensated and the discount rate will also become convex, because the average discount rate changes over different time intervals. Because of the many different assumptions that have to be considered when using the discounted utility theory, the discounted utility function people have for valuing certain benefits or costs in the future will not be used. The experiment that had to be done for this research only had limited time available (ten minutes approximately). As a result respondents could undergo only a limited number of tests and a limited number of (time-discounting) questions. Therefore, another way of testing the time discounting manner has been developed.

Loewenstein and Prelec (1992), as explained in the 'Theoretical Framework', state that the unawareness of a person about its preferences over time could go from completely 'naïve' to completely 'sophisticated'. They state that the level of 'sophistication' can be measured

through educating them about the loss of control or provide the incentive for a person to increase commitment to the future self. A manner to identify the level of 'sophistication' is to look for evidence of commitment. A sophisticated person who knows that his preferences will change over time, might choose an option that is inferior now but at a later time more optimal. For example, a person who currently prefers €110 in 8 days over €100 in 7 days but knows that in 7 days he wants €100 now over €110 the next day. That person might want to commit himself now to the option €110 in 8 days.

To test this level of sophistication this research uses a couple of intertemporal tasks with two options. One option is the 'naïve' one and the other the more 'sophisticated' one. The most sophisticated choice can also be explained as the most rational choice or most beneficial choice from an economic point of view.

The choice option measures the time discounting manner each individual has. The questions encompass the discounting technique, see appendix A. Supposing that when respondents who take their future into account, their way of discounting will be more rational or economic of nature (i.e. their preferences will be stable across different time intervals).

As can be seen in the appendix, three different blocks of choice sets will be asked, with three different time horizons that encompass choices within years (QA), months (QB, QC and QD) and days (QE). Theory states that the individual discount rate decreases when choices have to be made further ahead in the future. Therefore it is expected that this effect will be more visible for the questions with time horizons that encompass choices within years and less visible for the questions with time horizons that encompass choices within days.

The discount rates of the questions were calculated and can also be seen in appendix A. The discount rates were calculated in the following way; monetary value option $1/(1+x)^t$ = monetary value option $2/(1+x)^t$. When the respondent can choose between 50 euro now or 50 euro + 20 euro = 70 euro in a year, as is the case with the first question of QA, the discount rate becomes $50 = 70/(1+x)^1$, where x becomes 0.40. If the subject prefers the 50 euro now than it can be inferred that the discount rate of the subject is higher than 40% per year; otherwise we can infer that it is 40% per year or less. The same calculations were done for the other questions, where the discount rate per month and per day was calculated.

Also questions which do not require calculations, but test if a person is prepared to take decisions about the future were asked. For example, if one is prepared to engage in more

planning, for example, for retirement, or is more interested in investing in funds or stocks, see appendix E for these questions. These kind of actions (e.g. managing resources, like money and time, controlling ones weight, drinking/smoking behavior or other health related activities) arise typically when self-regulation failure occurs (Nenkov et al., 2007). This is in line with findings in former research where is stated that the accuracy of future decision is influenced by the level of self-regulation, as explained in the section 'Self-Control'.

4.2 Measuring the baseline level of awareness of the future self

The elaboration on potential outcomes (EPO) represents a generalized predisposition towards thinking about (future) consequences. EPO captures the level to which individuals differ in the way they generate potential consequences of their behaviors, evaluate the likelihood and importance of these consequences and encode these consequences with a negative or positive focus. In the article of Nenkov et. al. the method was used to establish a link between a consumers' EPO scale and their self-regulation behavior, like compulsive buying, credit card debt, retirement investing and healthy lifestyle. They found that consumers that score higher on the EPO scale are more effective self-regulators when making a choice. They also found that the EPO scale can be primed temporarily (Nenkov et al., 2007).

The EPO scale used for this research, see appendix B, was shortened from 13 to 7 questions, because of time restrictions of the lab experiment. Though, the three dimensions (factors), the generation/evaluation factor, the positive outcome focus and the negative outcome focus dimension, were still equally represented in the questions. The questions with the highest factor loadings were maintained. The respondents were asked to give the level of agreement to the statements using a seven-point Likert Scale.

In this research the EPO scale was used to establish to what extend people consider the future, or to what extent they are capable to control the self. The awareness of the future can be tested according to the EPO-scale. Afterwards, the relation between a person's level of self-control and the discounting manner was tested to investigate if people who are more able to consider the future are truly more adequate discounters of future values.

Besides the EPO scale two other variable were incorporated in the model, see appendix B. A seven point likert scale was used to test to what level people feel *connected* with their future self and to what level they *like* the future, see appendix D. This measurement is also used by Bartels and Urminsky (forthcoming paper) in order to explain impatience in intertemporal preferences. The future continuity scale was also used by Hal Ersner-Hershfield

et. al. (2009) to test the effect of the level of future self-continuity on time discounting and on the likelihood of saving for the future.

4.3 Measuring the baseline level of Nostalgia Proneness

As described in the Theoretical Framework, age and psychographic differences are two of the phenomena that are associated with nostalgia. Age seems to be positively correlated with nostalgia proneness, but nostalgia proneness can also differ across persons of the same age due to psychographic differences. In this research we can only test for psychographic differences as the sample contains persons of the same age.

To explore the potential effect of nostalgia the level of nostalgia proneness has to be measured first. In 1993 Holbrook developed a 20-item index of nostalgia proneness to explain preferences of consumers toward a large set of 125 products. The nostalgia scale of Holbrook consists of 20 statements that are accompanied on a nine-point scale, ranging from strong agreement to strong disagreement. The index was developed to explain the differences on nostalgia proneness between consumers of the same age and across ages. Holbrook found that nostalgia (with both age and nostalgia proneness together) does play a role in consumption preferences. However, the effects of age and nostalgia proneness operate independently when shaping these preferences. This states that the individual nostalgia proneness is developed independently of age (Holbrook, 1993).

Later on, Holbrook investigated if nostalgia proneness could be used for consumer segmentation. The same nostalgia scale as before was used together with two other scales; the Experience scale (Taylor and Konrad, 1980) and the Antiquarianism Scale (McKechnie, 1974) to explain differences in consumer preferences towards auto-mobiles. This suggests that nostalgic effects can be used to measure preferences for a large range of products (Schindler and Holbrook, 2003). For this research the same the nostalgia scale of Schindler and Holbrook was used, see appendix C.

4.4 Conceiving the past and the future

For the first and third hypothesis the individuals in the lab study have to be confronted with their future-self or past-self before their Time Discounting manner was tested. According to Ebert and Prelec (2007), hyperbolic discounting can be improved if respondents are provided with enough time and information, with a visual cue and a room in which they could concentrate. In this study the experimental environment met these conditions. However,

instead of a visual cue, this study used the manipulation to trigger the respondents to concentrate and focus.

Boven and Ashworth (2007) examined whether people have more intense feelings towards the past than towards the future. In an experiment the respondent had to relive and pre-experience certain emotional events; ones that were routine, unambiguous (for reliving the past) and hypothetical (for pre-experiencing the future).

D'Argembeau and Linden (2004) state that in daily life people frequently engage in mental time travel, they relive experiences and imagine possible future events. They developed a method in which people were challenged to relive and pre-experience past- and future events.

For this lab study three manipulations were developed. A study by Newby-Clarck and Ross (2002) also uses this method to test if individuals conceive the future more optimistic than the past. The study they used was to compare people's views of their past and future. The participants had to recall and anticipate on personally significant episodes in their lives. Davis (1990) stated that when people are prompted they can readily recall positive and negative episodes from their past and are able to recall feelings of wonderment, sadness, happiness, anger and fear. In the study of Newby-Clarck and Ross (2002), they try to do the same for the future. Participants were instructed to generate a list of five positive and five negative events of the past and the future. The study found that participants had more trouble with the five negative events of the future than with the other events.

For this lab study the same method, where people have to come up with five positive and five negative events for a certain time episode, was used. Where one group was confronted with their past of 10 years ago and earlier, another with their present and a third with their future of 10 years ahead and further. See appendix F, G and H for these manipulations.

4.5 The control group

As stated in the former section, the respondents were divided into four different groups. The manipulations consisted of three groups that are manipulated towards the past, the present and the future and one control group that is not manipulated. The group that is manipulated towards the present functioned as the control group as well as the non-manipulated group. The

control groups were formed to check if the past-manipulated and the future-manipulated group are different from the present-manipulated group and the non-manipulated group.

4.6 The experiment

The sample comprised Erasmus University students. Approximately 250 respondents were recruited to participate in a lab study in exchange for five euro's. The questionnaires the respondents had to fill in took 30 minutes. Before the general questionnaire was answered, the respondent would go through one specific manipulation. Before the experiment took place a pre-test was done among six persons (family and friends) to check if the questions were understandable, good to read and how long it took to fill in the questionnaire.

In this experiment, the respondents were triggered to think about the past, the present or the future. Duration of time intervals was primed by a manipulation. The sample contained four groups, three experimental groups and a control group. To test if there are differences between the groups, the experimental groups were randomly assigned to a manipulation and the control group was not assigned to a manipulation. In total 23, 29, 30 respondents were exposed to the manipulation of the past, the manipulation of the present and the manipulation of the future respectively. The control group contained 121 respondents and they were not exposed to a manipulation. The demographics of the respondents are presented in Appendix J.

After the manipulation, all groups had to fill in questionnaires. Fifteen respondents did not fill in this questionnaire correctly and those were removed from the data. The first part of the questionnaire contained questions that tested the way of time discounting. Question QA3, QC and QD of the discount questions were reversed in the data.

As can be seen in the theoretical framework in Figure 1 the independent variable in this model is the level of awareness of the future self and the level of nostalgia proneness. To examine the difference the manipulation triggers on focusing on the past/future compared to baseline awareness of the future self and baseline nostalgia proneness, all respondents had to fill in the scales as described in the former paragraph. The scales had to be filled in after the questions that test the time discounting technique, because filling in the scales could influence the way people discount.

Because of time restrictions the amount of questions asked was somewhat shortened from the original scales. The questions with the highest factor loadings were remained. The EPO scale remained enough questions for all the three factors it measures. Question 1, 4, 7

and 8 of the Nostalgia scale were asked in reversed direction to reduce the effect of scale response biases.

After the experiment a questionnaire had to be answered that maps the personal characteristics of a respondent, to estimate to what level they are rational/economic thinkers. Furthermore, questions that map personal information, like age, gender, faculty and income, will be answered. They intuitively could capture differences between the respondents.

4.7 Data analysis method

Many different combinations of dependent and independent variables were done in statistical tests in SPSS, because as can be read in the 'Results' the results were not clear cut. For that reason, and given that the past manipulation has not been tested before and the small sample sizes, all the effects were tested at 10 % significance level. The exact statistical tests used and the combinations of the different variables will be explained in this section.

4.7.1 Operationalization's and methods of analysis of the dependent variable

The time discounting questions had binary outcomes, A or B, and after the experiment these data were recoded. The more 'naïve' or 'irrational' choices became outcome 'A' and the more 'sophisticated' or 'economically more beneficial' choices became outcome 'B'. The dependent variables were recoded into three different manners were used; the proportions, the average discount rate and they were classified in four different groups. To test to what level respondents made rational choices about the future the *proportion* of 'B'-answered questions was calculated per respondent. Also the discount rate of the question was used to put more 'weight' on the questions with the higher discount rates and to calculate the *average discount rate* of a respondent. On top of that, a very effective and recent method used by Bartels and Rips (2010) was used for measurement of the dependent variable. For this method only the dependent variables QA from appendix 10.1.1 were used. The questions encompassed choice options between two monetary values; an immediate and a delayed reward. The third question was removed from the data, because it had a discount rate of 0%. The discount questions QB-QE were not used in this analysis, because they sketched scenario's and situations a respondent could be in, but they did not encompass purely monetary choices. Bartels and Rips (2010) do only use these kind of variables, so it was better to use only monetary choice options. The respondents were classified into *four different groups*, according to the personal discount rate they had. The discount rate of each question are presented in appendix 10.1.1. The discount rate is the 'indifference point' where the respondent is indifferent between

choosing the delayed and the immediate reward. When someone had chosen for *all* the immediate rewards (answer A) over the delayed rewards (answer B), they were assigned the score of 1. (Consequently that person has a higher personal discount rate than 80%). When a participant had chosen all the immediate rewards *except* of the rewards with the highest discount rate (80%) and/or the second highest discount rate (57%), they were assigned the score of 2. When they chose all the delayed rewards *except* of the rewards with the lowest discount rate (14.47%) and/or the second lowest discount rate (25%), they were assigned to the score of 3. The score of 4 was assigned to participants that chose *all* the delayed rewards over the immediate rewards. In table 1 is explained which personal discount rate belongs to the score the respondent was assigned to.

Table 1: Personal discount rate that belongs to each score

Score:	
1 =	discount rate > 80%
2 =	discount rate between 40% and 80%
3 =	discount rate between 14,47% and 40%
4 =	discount rate < 14,47%
5 =	contradicting answers (i.e. could not be classified in scores and were removed from the data)

The score of 5 was assigned to the 43 respondents that gave contradicting answers. They could not be classified by any of the four scores and were removed from the data.

Chi-square tests

The dependent variable was tested against the manipulations. To search for differences between the manipulated groups, *all the time discounting questions separately* against the manipulated groups were tested in Chi-square tests. Also the *four different scores* were tested in a Chi-square test against the three manipulations. The significant crosstabs that came out of this are discussed in the section 'Results'.

With the crosstabs per question, which resulted in many different tables, only a few time discounting questions reached significance. To gain clarity only the tables that resulted in significant outcomes were presented in the section 'Results' and 'Appendices'.

Linear regressions

With the method described above, a lot of different time discounting questions were used as dependent variables. The effect of a manipulation on one single dependent variable could not be measured. Therefore it was decided to take some of the time discounting questions together to generate fewer dependent variables. The dependent variables were derived through calculating the:

- Average discount rates of a respondent per question block; QA, QB, QC and QE.
- Proportions of answer 'B' of a respondent, with:
    - Proportions per question block; QA, QB en QE.
    - The proportion of all the time discounting questions together.

Binary logistic regressions

The questions that also measured the baseline level of self-control questions, see question 5, 6, 7 and 8 in appendix E, were also used as dependent variables. Because their outcome was binary (either zero or one) a binary logistic regression was used.

4.7.2 Operationalization's of the independent variables

The manipulations

The manipulations were used as the independent variables in this research. Many different combinations of the three groups and the control group were tested on similarities/differences between the manipulated groups:

- Past-manipulation against future-manipulated group
- Past-manipulation taken together with future-manipulated group against present-manipulated group

These combinations were either tested;

- without both control groups (without present-manipulated group and non-manipulated group), or
- with the present-manipulated group, but without the non-manipulated group

All these combinations were used to test the effect on the dependent variables as described in the section above. Dummy variables were made in SPSS to code the different manipulations.

The individual traits

The individual traits were used either separated or together with the manipulation-dummies in linear regressions, because all the individual traits were continuous variables. For the EPO-scale the effect of the average score on the likert scale as a whole as well as the averages of the three factors the EPO scale consists of were used as independent variables. For the variables 'Future liking/connectedness' and the 'Nostalgia scale', the average scores on the likert scale of a respondent were used as de independent variables in the linear regression models.

5. Results

Former research has shown that on average 'future thinkers' are discounting the future better (i.e. they have a lower discount rate), but for nostalgic people this effect is unknown. This research tries to find differences or similarities between the effect of past manipulations and future manipulations on valuing future pay-offs. Results are given in the section 'differences between future and past' and 'similarities between future and past'. In the section 'future confrontation' and 'past confrontation' the results of the manipulations towards the past and the future on the time discounting manner will be discussed. Hypothesis 2 and 4 encompass the manipulation, therefore they will be discussed at first. Finally, in the section 'individual traits', hypothesis 1 and 3 will be discussed. These encompass the results according to the baseline level of nostalgia and the baseline level of future awareness on time discounting. All the significant results will be supported with tables from the statistical tests that were done. For clarity reasons the non-significant tables are left out.

5.1 Differences between future and past

This section addresses the question if people who were manipulated towards the past become indeed worse at valuing future pay-offs, and, if future manipulated people become, as expected from the theory, indeed better at valuing future pay-offs. In this data some differences were found between the past- and future manipulated groups on the time discounting questions that were discounted to *years*. No evidence is found for the other questions, where the time discounting questions were discounted to months and days. An explanation could be that differences are only visible when time discounting has to be done in the far future. For time discounting questions that only encompassed valuing the near future (i.e. days and months) the effect does not show up.

5.1.1 Future confrontation (H2)

The confrontation with the future is expected to have a positive effect on time discounting, according to the second hypothesis:

H2: When confronted with their future, individuals' discount rate decreases.

In this data evidence for the second hypothesis is found for the time discounting questions that were discounted to years. In table 2a, 2b and 3 these effects are visualized. No evidence, except for a few questions, was found for the time discounting questions of the more distant future (months and days).

As explained in the methodology, the four different groups that were formed by assigning scores towards each individual were tested against the past- and future manipulation in a Chi square test. Evidence at a 5% significance level (0.026<0.05) was found that the past- and future manipulated group behave different from each other when evaluating potential future outcomes. In table 2a is showed that the 66.7% past-manipulated group got a score of 2, which means they have a personal discount rate between 40% and 80%. A higher personal discount rate means they consider future consequences worse, which is in line with the fourth hypothesis.

Of the future-manipulated group, 45.5% got the score of 3, which indicates a personal discount rate between 14.47% and 40%. A lower personal discount rate means they consider future consequences better, which is in line with the second hypothesis.

Table 2a: Crosstab manipulation past- and future on the four different groups each respondent was classified in.

Manipulation * Score Crosstabulation

			Score				
			1,00	2,00	3,00	4,00	Total
Manipulation	1,00 (past)	Count	2	12	1	3	18
		% within Manipulation	11,1%	66,7%	5,6%	16,7%	100,0%
	3,00 (future)	Count	3	6	10	3	22
		% within Manipulation	13,6%	27,3%	45,5%	13,6%	100,0%
Total		Count	5	18	11	6	40
		% within Manipulation	12,5%	45,0%	27,5%	15,0%	100,0%

Table 2b: Manipulation past and -future on the four different groups each respondent was classified in.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9,256[a]	3	,026
Likelihood Ratio	10,387	3	,016
Linear-by-Linear Association	1,187	1	,276
N of Valid Cases	40		

a. 5 cells (62,5%) have expected count less than 5. The minimum expected count is 2,25.

To test this hypothesis the discounting questions that were asked during the experiment were analyzed *separately* as well. For two of the five questions, as can be seen in appendix I, there were significant differences between the past- and future manipulated groups. The results of the Chi-squares tests are presented in Table 1a en 1b in appendix I. For the question *'€50 now or €70 in a year'* significant differences exist between the past- and the future manipulated groups at a 5% level (0.03<0.05). For the question *'€50 in a year or €90 in 2 years'* significant differences exist between the past- and the future manipulated groups at a 10% level (0.065<0.10). For the other three questions that were discounted to years, there were no significant differences between the groups.

Also a linear regression analysis was done for this set of questions, as can be seen in table 3. The independent variables 'Future_dummy', is a dummy variable for the 'manipulation towards the future' and was tested in a linear regression on the dependent variable 'Proportion_answer_B_years_questions', which for the proportion rationally/economic answered questions that were discounted to *years*. The independent variable 'Future_dummy' reaches significance at a 10% level (0.088<0.10). The beta coefficient is positive (7.874), meaning that when a person is manipulated towards the future, on average his proportion rationally/economic answered questions that were discounted to *years* will increase.

It can be concluded that an individual who has been confronted with his future self, has on average a lower discount rate when evaluating future values. This indicates that they evaluate decisions for the future better. In this case the future values encompass *years*, varying from 1 to 4 years from now.

Table 3: The effect of baseline future awareness on time discounting

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	52,682	1,761		29,913	,000
	Future_dummy	7,874	4,593	,120	1,714	,088

a. Dependent Variable: Proportion_answer_B_years_questions

5.1.2 Past confrontation (H4)

The confrontation with the past is expected to have a negative effect on time discounting, according to the fourth hypothesis:

H4: When confronted with their past, individuals' discount rate increases.

As already stated in section 5.1.1 and in tables 2a and 2b, evidence was found that the past-manipulated group behaved significantly different from the future-manipulated group. It can be concluded that an individual who has been confronted with his past self, has on average a higher discount rate when evaluating future values. This indicates that they evaluate decisions for the future worse. In this case the future values encompass *years*, varying from 1 to 4 years from now.

Former research shows that there exists no evidence that nostalgic people discount the future less or more. A manipulation to enhance a possible effect did work (i.e. when an person is manipulated towards the past their discount rate for future pay-offs will be increased). It can be concluded, from this data, that it is possible to increase the baseline level of nostalgia proneness of an individual. Only evidence was found with testing the manipulations against the four different scores; a method also recently used by Bartels and Rips (2010), but from the other tests, with the proportion and the average discount rate as the dependent variable, no evidence was found that a confrontation towards the past would lead to higher personal discount rates. In the next sections the baseline level of nostalgia proneness on time discounting will be illustrated.

5.2 Similarities between future and past

Just evidence was found for some of the questions that the future manipulated group was different from the past manipulated group. Therefore, for the other questions was tested if the

past and future groups behave the same. But no evidence is found whether the past- and future manipulated groups behave the same on time discounting. No tests resulted in significant evidence that the past- and future manipulated group together behaved differently from the present manipulated group or the control group.

5.3 Individual traits

The second and fourth hypothesis of this research were formulated to check if there exists any relation between 'Time Discounting' and the individual traits; 'the baseline level of future awareness' and 'the baseline level of nostalgia proneness'. For both traits evidence is found for the time discounting questions that were discounted to months. No evidence is found for the other questions, where the time discounting questions were discounted to years and days.

5.3.1 Baseline level of future awareness (H1)

The baseline level of future awareness is expected to have a positive effect on time discounting, according to the first hypothesis:

H1: When individuals have a higher baseline level of awareness of their future, individuals' discount rate decreases.

In this data such an effect was not found for any of the time discounting questions. Though, an interaction effect was found between the baseline awareness of the future and the confrontation with the future (i.e. the manipulation towards the future). In table 2 these effects are visualized.

The independent variables 'Future manipulation' and 'Average EPO Scale', in table 4, stand for the 'future confrontation' and 'the baseline awareness of the future' respectively. The 'Interaction_Future_EPO', stands for the 'Future manipulation' times the 'Average EPO Scale'. The three variables were regressed against the dependent variable 'Proportion_answer_B_months_questions', which stands for the proportion rationally/economic answered questions that were discounted to *months*. Only the interaction variable 'Interaction_Future_EPO' reaches significance at a 10% level (0.077<0.10). The beta coefficient is positive (19,387), meaning that when a person scores higher on the average EPO-scale and is manipulated towards the future, on average his proportion rationally/economic answered questions that were discounted to *months* will increase.

It can be concluded that an individual who has a higher baseline awareness of the future *and* is confronted with his future, has on average a lower discount rate when evaluating

future values. This indicates that they evaluate decisions for the future better. In this case the future values encompass *months*, varying from 6 to 24 months from now.

Table 4: The effect of baseline future awareness on time discounting

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	65,489	14,312		4,576	,000
	Interaction_Future_EPO	19,387	10,914	1,062	1,776	,077
	Future_manipulation	-80,782	49,660	-,967	-1,627	,105
	Average_EPO_scale	-2,807	3,295	-,063	-,852	,395

a. Dependent Variable: Proportion_answer_B_months_questions

For the variables 'the level of connection to the future' and 'the level of liking the future', which were also used to test baseline awareness of the future, such effects did not show up. Although, a binary logistic regression resulted in another finding, see table 5. The variable 'the level of liking the future' has a positive significant effect at a 5% level (0.042<0.05) on whether or not to invest in funds, stocks or other investments, which is one of the variables that indicate the level of *self-control* an individual has. People that *like* their future ten years from now more, are on average more likely to have invested in funds, stocks or other investment objects than people that less like their future ten years from now.

Table 5: The effect of the level of liking the future 10 years from now on investing in funds, stocks or other investment objects.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Liking_future	,321	,158	4,131	1	,042	1,379
	Constant	-3,356	,930	13,032	1	,000	,035

a. Variable(s) entered on step 1: Liking_future.

5.3.2 Baseline level of nostalgia proneness (H3)

Based on former research it was not known what effect the level of nostalgia proneness would have on time discounting. Though, in this research, the baseline level of nostalgia proneness is expected to have a negative effect on time discounting, according to the third hypothesis:

H3: When individuals have a higher baseline level of nostalgia proneness, individuals' discount rate increases.

In this data evidence for the third hypothesis is found for the time discounting questions that were discounted to months. In table 6 these effects are visualized. No interaction effects between the baseline awareness nostalgia proneness and the confrontation with the past (i.e. the manipulation towards the past) were found.

The independent variables 'Nostalgia_scale', in table 6, stands for the 'the baseline level of nostalgia proneness' and was tested in a linear regression on the dependent variable 'Average_discount_rate_months_questions', which states for the average discount rate a subject has for the questions that were discounted to *months*. Although, the constant coefficient does not reaches significance, the independent variable 'Nostalgia_scale' reaches significance at a 5% level (0.29<0.05). The beta coefficient is positive (0.347), meaning that when a person scores higher on the nostalgia-scale, on average his average discount rate increases.

It can be concluded that an individual who has a higher baseline nostalgia proneness, has on average a higher discount rate when evaluating future values. This indicates that they evaluate decisions for the future worse. In this case the future values encompass *months*, varying from 6 to 24 months from now.

Table 6: The effect of the level of baseline nostalgia proneness on time discounting.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1,068	,682		1,566	,119
	Nostalgia_scale	,347	,157	,153	2,203	,029

a. Dependent Variable: Average_discount_rate_months_questions

As described before, no evidence is found for the third hypothesis; the baseline level of nostalgia proneness cannot be enhanced through the manipulation that was used in this research. Though, the baseline level of nostalgia proneness an individual has does have a negative effect on the time discounting manner, but only for future considerations about the upcoming 'months'. No evidence is found for the more distant future considerations that encompass 'years' from now or the more close future considerations that encompass 'days'

from now. More nostalgia prone individuals might not evaluate future considerations about the upcoming months in a rational/economic matter because of their nostalgia proneness, but they are not different from any other group when considering future consequences that are in a more distant future (years) or in a more close future (days).

Besides the evidence that is found for hypothesis 4, also correlation between 'the baseline level of nostalgia proneness' and 'the level of connection to the future' and between 'the baseline level of nostalgia proneness' and 'the level of liking the future' was found. These results are visualized in table 7 and 8.

Table 7 shows that the independent variable 'Nostalgia_scale' reaches significance at a 1% level (0.00<0.01). The beta coefficient is negative (-0.387), meaning that when a person scores higher on the nostalgia-scale, on average his level of feeling connected/similar to his future 10 years from now is influenced negatively.

Table 7: The effect of baseline nostalgia proneness on the level of feeling connected/similar to the future 10 years from now.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6,407	,443		14,450	,000
	Nostalgia_scale	-,387	,102	-,258	-3,777	,000

a. Dependent Variable: The level of feeling connected/similar to the future in 10 years from now

Table 8 shows that the independent variable 'Nostalgia_scale' reaches significance at a 5% level (0.028<0.05). The beta coefficient is negative (-0.228), meaning that when a person scores higher on the nostalgia-scale, on average his level of liking his future 10 years from now decreases.

Table 8: The effect of baseline nostalgia proneness on the level of liking the future 10 years from now.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6,353	,447		14,221	,000
	Nostalgia_scale	-,228	,103	-,154	-2,209	,028

a. Dependent Variable: The level of liking the future in 10 years from now

These results and the direction of the coefficient are all in the expected way. The results are not to test the discounting manner and the hypothesis, but they indicate that nostalgic people do not like the future and do not feel connected to the future, which is a logical and expectable result.

6. Discussion and conclusions

This research has analyzed (i) whether higher baseline future awareness affects time discounting and whether (ii) a confrontation with the future has an impact on evaluating decisions about the future. The research aimed at comparing these results of 'future-minded individuals' with 'past-minded individuals'. Therefore, the analysis also included (iii) whether higher baseline nostalgia proneness affects time discounting and whether (iv) a confrontation with the past has an impact on evaluating decisions about the future.

To analyze these questions data was used from an experiment among a sample of 121 university students at the Erasmus University Rotterdam. The students were manipulated towards the past, the present and the future. Their baseline attitude towards the past and the future was investigated and a set of questions was asked to explore their time discounting manner. They also answered questions concerning personal information, which could explore their level of self-control, which is related to evaluating potential outcomes and discounting.

First, a test was conducted in order to check whether the manipulation was successful. The outcomes of the past- and the future manipulated groups were compared with the control groups. Mixed evidence was found whether the past manipulated group was different from the future manipulated group. For the time discounting questions which encompassed valuing the *far future* (as in 1 to 4 years from now), evidence was found that the future manipulated group considers future consequences better than the past manipulated group. The results for H2 were

expected because former research has shown that certain manipulations towards the future could easily improve time discounting (Zauberman et al., 2009). However, for the time discounting questions which encompassed valuing the *near future* (as in the upcoming days and months) only evidence was found for a few cases. This means that *partial* evidence was found that supports the second hypothesis (**H2**).[1] An explanation for this outcome could be that the manipulation triggered respondents to think mostly about the more distant future and not about the near future. Which is plausible because they were manipulated towards the more distant future; they had to think about the future ten years from now. As described in the 'Theoretical Framework', importance or personal relevance of the topic influences future decision making positively. In the more distant future *the outcome* they expect to result from a certain behavior and *the likelihood* that the desired outcome will occur is more uncertain, but influences decision making negatively (Bandura, 1997). It could be that evaluating potential outcomes for the more distant future are made more important due to the manipulation and therefore the likelihood and the outcome are in this case not undervalued. The manipulation did not trigger to discount the upcoming days and upcoming months better. Those particular time intervals were not sensitive to the manipulation, it could be that they were too close to the present and were not considered as far future.

The past- and future manipulated group only behaved differently on some of the time discounting questions; it seems that the past manipulated group is similar to the future manipulated group. Though, they are not behaving similar as well. The behavior from the past- and future manipulated groups together on the other questions was not significantly different from the control groups (the present manipulated and the non-manipulated group).

Partial evidence was found for the effect of manipulations on time discounting. It might be that the manipulations are only momentary influences on top of the existing behavior a person has. Existing behavior might be more important because it is more enduring and stable over time and therefore it might explain better the manner of time discounting than the momentary influence of a manipulation does. Therefore it was important to analyze whether individual traits, instead of manipulations, explain behavior on time discounting better.

[1] H2: When confronted with their future, individuals' discount rate decreases.

The second point which was analyzed was whether a higher 'baseline awareness of the future', which is a measure of the level of self-regulation, as well as 'feeling connected with the future' and 'liking the future' influenced the discount rate negatively. Although, former research points out that higher levels of self-regulation are related with evaluating future consequences (Baumeister and Heatherton, 1996), support for the first hypothesis (**H1**) was not found is this data. The results are mixed though.[2] One test stated that people who *like* their future more ten years from now are on average more likely to have invested in funds, stocks or other investment objects (which indicates a higher level of self-regulation) than people who are less likely to like their future ten years from now. Newby-Clark and Ross (2003) propose people are more optimistic towards future events. They might not consider all the negative consequences that can occur. It might be that people who like the future ten years from now more are considering their future more optimistic and expect to have higher return on investments. That could be a reason why they engage more in investing in funds than others.

Moreover, an interaction effect between the baseline awareness of the future and the confrontation with the future (for the upcoming months) was found. Evidence is found that people who have a higher baseline level of awareness of their future *and* are confronted towards the future, through the manipulation, do discount the future better. Just a higher baseline awareness of the future does not trigger the individuals to discount the future better. A cue on top of this baseline awareness, which in this case was the manipulation towards the future, improves discounting. This is in line with former research, where different other 'cues' also improved the discounting technique (Ebert, Prelec, 2007).

During this research the nostalgic and future-oriented individuals were compared on their time-discounting manner as a main goal. Former research has not linked the level of nostalgia proneness on the way individuals evaluate decisions about the future. This data provided evidence that more nostalgic people have a higher average discount rate. Higher personal discount rates imply that they evaluate decisions about the future worse. Again just evidence is found for the near future and not for the more distant future. Therefore, just partial evidence has been found that supports the third hypothesis (**H3**).[3] It could be that nostalgic people do not like to look at the near future because in their minds they are still prone to the

[2] H1: When individuals have a higher baseline level of awareness of their future, individuals' discount rate decreases.

[3] H3: When individuals have a higher baseline level of nostalgia proneness, individuals' discount rate increases.

past. However, they might still think that their far future is important, because they consider the far future the same as any other group.

More nostalgic people seem to discount the (near) future worse than less nostalgic people. The manipulation towards the past could enhance this effect even more. Former research has not been executed on whether the consideration of future consequences would be influenced when people are confronted with their past. Through the manipulation towards the past used in this research the effect of being nostalgic on time discounting was intensified. Evidence was found in one of the Chi-square tests that support the fourth hypothesis (**H4**).[4] Former research shows that people can be manipulated towards the past and can readily and easily recall negative as well as positive things about their past (Davis, 1990). But this did not mean that they will also become more 'prone' to the past (i.e. that their level of nostalgia proneness would be enhanced) and it certainly did not mean that it would influence the way of evaluating future-pay-offs. However, the manipulation towards the past used in this research was able to show that evaluating future consequences could be influenced by the use of a manipulation, though negatively. It can be concluded, from this data, that it is possible to increase the baseline level of nostalgia proneness of an individual and that it is possible to increase the personal discount rate of a person even further.

No evidence was found that the manipulations influenced the questions that measured the discount rate for the close future (the upcoming 'days'). Not any significant results emerged from the data. This might be because those questions were too close to the present and were just considered as 'present'. Also the manipulations triggered individuals to think about ten years back in time and ten years ahead in time. It might be that they were more oriented towards that particular time interval because of the manipulation. That could be the reason they answered the questions about months and years more properly or rationally and not the questions which encompass decisions for the upcoming days.

7. Managerial Implications

This section describes to what level this research could contribute to managers and marketers. This section will discuss that the findings of the research resulted in opportunities for segmenting and product development. The manipulation towards the future could contribute

[4] H4: When confronted with their past, individuals' discount rate increases.

to this. However, the manipulations used for this research provided only partial evidence. Therefore further research should come up with enhanced manipulations –which will be discussed in section 8– before managers can apply it to their consumer market. Then the manipulations as well as knowledge about the baseline awareness of the future and the level of nostalgia proneness of consumers could help managers with segmenting their market and based on that, develop products. Moreover, when managers understand the behavior of their consumers and know in what ways their sensitivity towards the future can be improved, they can improve their advice to consumers about financial decisions for the future. Furthermore, managers can also effectively anticipate on the common time discounting mistakes of consumers once they know them, which will also be illustrated in this section.

This study found support for the effect that a confrontation with the future influences intertemporal decisions for the far future positively. It means that when consumers are manipulated towards the future they make more adequate decisions towards their future. When people have a higher baseline future awareness and when they are confronted with their future the evaluation and consideration of potential future values is increased even more, due to the interaction effect that was found.

Significant results for the future-manipulation on time discounting were only found for the far future and not for the near future. Managers can use similar manipulations to enhance future awareness and influence decision making for the far future, but not for the near future. The baseline awareness of the future can be tested with clients to know to what level they consider the future already. Both the manipulation towards the future and the baseline awareness of the consumer can impact the decision making process over different time intervals. For example, making use of the option of hire purchasing instead of paying the indebted amount instantly. Other fields where intertemporal decisions could occur are financial institutions. They have to advice their consumers about saving, retirement or investment decisions. Also universities could benefit from the knowledge, once they know how they can influence students to invest more in education instead of working immediately.

Once managers exactly know the baseline awareness of the future of their consumers they can effectively anticipate on it with manipulations towards the future. This can be done either when giving (financial) advisory to a client, but it can also be incorporated in advertising. Then managers can help the consumer with making more adequate decisions for their future.

This research did find partial evidence that the manipulation towards the past was efficient. When in further research a (better) manipulation is developed to make people more prone towards the past and they know exactly which manipulation triggers a certain segment, it can be used for marketers as well. Once it is known to what episode from the past a certain segment is sensitive, it can be used in advertising to trigger nostalgia proneness. Products could be developed that have associations with the episode from the past a consumer is sensitive to. The manager could try to stimulate sales with this.

On the other hand, once managers know where the common time discounting mistakes lie, they can anticipate on it as well. When managers know to what periods their consumers are sensitive to it can be promising. For example, if managers know why a consumer can suddenly have an increase in desire to buy a product, managers can anticipate on this by triggering that feeling and increase sales. The study also provided evidence that more nostalgic people make irrational decisions for the near future. For those people the manager can aim at selling products for that particular period also. Once they know to what particular episode or period from the past their consumer was fond, they can try to sell products that are related to that certain episode within that particular time interval (in this research the particular time interval lay in the upcoming months).

8. Limitations and further research

Further research could try to enhance the questions and ambiguities that were faced in this research and that were discussed in the section 'Discussion and conclusions'. A major difficulty faced in this research is the limited evidence for the differences between the manipulated groups on the discount questions that measured the level of accuracy in time discounting. As already discussed in former sections, the evidence that was found was only partial or derived from some of the questions, but not from all of the questions. This lack of results may be due to the small sample sizes which were used for the manipulations. This lack might also be caused by the ineffectiveness of the dependent variable or the ineffectiveness of the manipulations. It could also be due to the fact that the personal discount rate could not be calculated. This section will discuss the pitfalls of this research and possible improvements in these topics for further research.

8.1.1 The dependent variable

The fact that only partial evidence was found that supports the hypotheses could be due to the ineffectiveness of the dependent variables; the time discounting questions. The questions

included time discounting on three different time intervals that lie in the future; the upcoming days, -months and -years. For the 'days-questions' no significant results were found at all, for the other questions only limited evidence was found.

The ineffectiveness of especially the months- and the days- questions (see question QB-QE, in appendix A) could be due to the fact that the discount questions did not encompass only choice options between 'purely' monetary values, but the these questions sketched scenario's or situations a respondent could face. For these questions hardly evidence or no evidence at all was found. It might be due to the kind of case or scenario that was sketched. Another case or scenario could also be developed where the intertemporal decision making progress is included. The case could be a more marketing oriented scenario, with for example decisions between particular brands or products. With this method the aspect of intertemporal decision making would be captured, together with examining the decision making process within a certain field in the market. With that only choices between the more 'rational' or more 'naïve' options could be investigated, but to calculate an exact discount rate it is recommended to use only choice options between monetary values. Therefore, further research should best use strictly choice options between monetary values like for instance Kirby et. al. (1999) did. In this study only five of that kind of questions were used (see appendix 10.1.1), while Kirby et. al. recommend 27 questions.

Sometimes respondents gave contradicting answers (e.g. with one question they claimed to have a discount rate higher than 40% and for other questions in the same time interval they claimed to have a discount rate lower than 20%). With the methodology of Bartels and Rips (2010) this study used, 43 respondents had to be removed from the data. Due to that the sample size became even smaller.

Besides, a hyperbolic function, as theory explained, could not be discovered from these three time intervals because no results were found that stated the discount rate decreased when the time interval lay further ahead in the future. This could be caused by the small amount of questions that were asked (six per time interval), but it could also be due to the time intervals that were used in this research. For example, Bartels and Rips (2010) used a much broader time interval, with the upcoming 15, 25 and 35 years. In this study only the upcoming days, -months and the upcoming year to the upcoming four years were used.

8.1.2 The manipulation

The future-manipulation used in this research, triggered people to think about the far future and the past-manipulation triggered them to think about the past. For the future-manipulation as well as the past-manipulation, only evidence was found for the time discounting of the *far future.* A recommendation could be to develop manipulations that triggers persons to think of the near future (e.g. days) and for the semi- near future (e.g. months); so for every time interval that is tested a single manipulation towards that particular interval should be used. When manipulations are made more specifically towards the certain time interval that is tested, results could be improved. However, this would require a lot of different manipulations and a lot more respondents.

For the manipulations towards the past also partial evidence was found. Former research, though recent, developed already methods to enhance future awareness. Further research should examine if other manipulations could be developed to increase the baseline level of nostalgia proneness. The manipulation used in this research did affect the baseline level of nostalgia proneness of a person but only for the far future. This problem should have been faced earlier in this research, so another manipulation could have been set up for as well the future- as the past confrontation. A recommendation for future researchers could be to make the manipulation towards the past more specific with certain episodes, so one could re-experience the past. E.g. episodes from the news or other events that had happened in that time and that were of particular interest of the respondent. The research then becomes more specific towards every respondent because every respondent has a different favorite event from their past. Newby-Clarck and Ross (2002), who's method was the inspiration for the manipulations used, show that often negative episodes are remembered, but the future is seen much more positive. Therefore the event should bring positive associations for the respondent to make them fonder of the past, then they might become more prone to the past. It can be concluded that different manipulations should be applied to different segments. Holbrook and Schindler (1994) already suggested this when making consumers fonder of cultural products.

8.1.3 The individual traits

Limited results were also found for the individual traits, the baseline level of nostalgia and the baseline future awareness. It can be recommended to include other traits as well in further research. For example, the Self-Efficacy Scale of Bosscher et. al. (1998), which tests the level of motivation a person has to evaluate decisions, or other traits which can map the baseline behavior of an individual when making decisions for the future. Also the metric

developed by Zimbardo and Boyd (1999), which measures individual differences on time perspective, which could explain differences in behavior. In addition to this, further research should test to what extend the baseline behavior of a person is decisive in time discounting and if this baseline behavior can be enhanced through manipulations.

No former research has been done to test the level of nostalgia on time discounting. This research found that nostalgic people discount the near future (as in the upcoming months) less efficient. For the upcoming years there are no differences between nostalgic and non-nostalgic people, only when they were manipulated towards the past. This is highly unusual because people are hyperbolic discounters and they discount the far future more inaccurate than the near future. Therefore it was expected that when one is more nostalgic the discount rate for the far future would decrease even further. Further research should examine the exact utility function of a nostalgic person as described above. Only then it becomes clear why the near future is discounted more inaccurate instead of the far future.

8.1.4 The methodology

One problem that occurred with respect to the discount questions was that one single discount rate per person could not be calculated, at least not an exact one. Therefore, the exact utility function a person has over time could not be calculated as well. As one can see in appendix A, the discount questions consist of two options. When a respondent chooses one option over the other, the only thing that is known is the range their discount rate lies in. Respondents can only answer that for one particular question their discount rate is lower than or higher than the corresponding discount rate. In this study the range in which each respondents' personal discount rate lay was calculated with the methodology Bartels and Rips (2010) used. This method is still recommended for further research because it was effective in this study. However the exact personal discount rate could not be measured with it.

Furthermore, based on former theories, respondents cannot have one discount rate because the personal discount rate is hyperbolic and changes when the time interval in the future changes. Therefore, for every single time interval the exact single discount rate should be calculated and then a personal utility function can be derived (Abdellaoui et. al., 2006). This will require a lot of discounting questions through many different time intervals, which would require a lot of time for an experiment.

According to Abdellaoui et. al. (2006), the exact discount rate can only be calculated when all the time intervals have the same unit of time and have common final periods, which

was not the case in this study. The exact discount rate can also be calculated with open questions, where a respondent writes down his own monetary reward (and thus discount rate). But when a respondent decides on the monetary reward the answer given could be biased as he does not know what monetary amount he wants. When the situation occurs in the real world, the respondent might choose another monetary amount. Therefore this could be tested in an experiment with real money amounts and decisions about the future.

In the study of Christopher et. al. (2008) another methodology was found with one could calculate the exact personal discount rate of a person. According to them the personal discount rate can be calculated through the maximum likelihood model. It is recommended for further research to use an approach like this. In Appendix K, the exact method to be used is explained. Though, this method can exactly measure a person's discount rate, Christopher et. al. (2008) state that this personal discount rate is only weakly correlated with intertemporal decision making. Therefore, it is still a great challenge for future researchers to develop a methodology with a lot of predictive power and which can exactly measure the causes of intertemporal choices.

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10. Appendices

10.1 Appendix A

10.1.1 QA: questions discounted to years5

				Discount factor:
☐	€50 now	or	☐ €70 in a year	40%
☐	€100 in 1 year	or	☐ €150 in 4 years	14.47%
☐	€100 now	or	☐ €100 in a year	0%
☐	€50 in 1 year	or	☐ €90 in 2 years	80%
☐	€50 now	or	☐ €300 in 4 years	57%
☐	€100 in 1 year	or	☐ €125 in 2 year	25%

10.1.2 QB: questions discounted to months

				Discount factor:
☐	3 days now	or	☐ 7 days in 6 months	15%
☐	5 days now	or	☐ 10 days in 12 months	6%
☐	7 days now	or	☐ 14 days in 18 months	4%
☐	9 days now	or	☐ 19 days in 24 months	3.2%

10.1.3 QC: questions discounted to months

Discount factor: 1.6%

A. Six monthly payments of €200 each during the six months before the vacation.

B. Six monthly payments of €220 each during the six months beginning after you return.

[5] These questions were derived from a method used by Borghans and Goldsteyn (2006).

10.1.4 QD: questions discounted to months

Discount factor: 1.6%

A. Six monthly payments of €200 each during the six months before the washer and dryer arrive.

B. Six monthly payments of €220 each during the six months beginning after the washer and dryer arrive.

10.1.5 QE: questions discounted to days

				Discount factor:
☐ Receive tomorrow	or	☐	receive €5 to wait 3 days	3.2%
☐ Receive in 4 days	or	☐	receive €5 to wait 6 days	4.8%
☐ Receive in 7 days	or	☐	receive €5 to wait 9 days	4.8%
☐ Receive tomorrow	or	☐	receive €10 to wait 6 days	3.1%
☐ Receive in 7 days	or	☐	receive €10 to wait 12 days	3.7%

10.2 Appendix B

10.2.1 EPO-scale[6]

1. I try to anticipate as many consequences of my actions as I can.
2. Before I act I consider what I will gain or lose in the future as a result of my actions.
3. I always try to assess how important the potential consequences of my decisions might be.*
4. I try hard to predict how likely different consequences are.
5. Usually I carefully estimate the risk of various outcomes occurring.*
6. I keep a positive attitude that things always turn out all right.
7. I prefer to think about the good things that can happen rather than the bad.
8. When thinking over my decisions I focus more on their positive end results.*
9. I tend to think a lot about the negative outcomes that might occur as a result of my actions.
10. I am often afraid that things might turn out badly.*
11. When thinking over my decisions I focus more on their negative end results.
12. I often worry about what could go wrong as a result of my decisions.*
13. Before I act I consider what I will gain or lose in the future as a result of my actions.*

[6] The questions with a '*' were removed from the original questionnaire.

10.3 Appendix C

10.3.1 Nostalgia Scale[7]

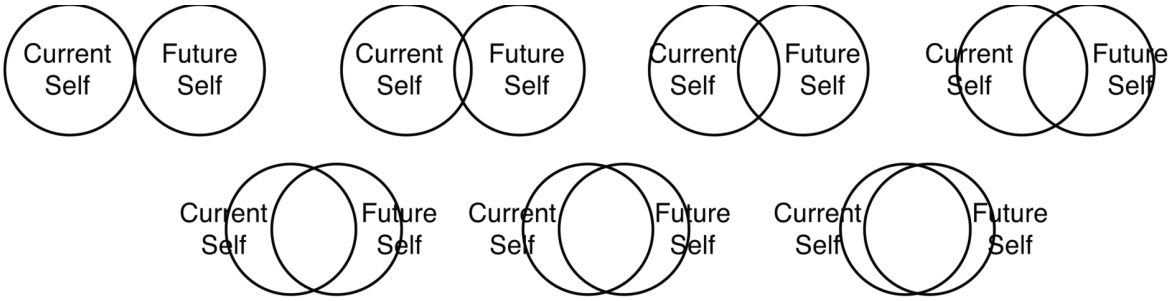
1. They don't make 'em like they used to*
2. Newer is almost always better
3. In the future, people will have even better lives*
4. Things used to be better in the good old days
5. I believe in the constant march of progress*
6. Yesterday, all my troubles seemed so far away*
7. Products are getting shoddier and shoddier*
8. Compared to our parents, we've got it good
9. Technological change will insure a brighter future*
10. When I was younger, I was happier than I am today
11. Today's new movie stars could learn from the old pros
12. I must admit it's getting better, better all the time
13. The truly great sports heroes are long dead and gone*
14. History involves a steady improvement in human welfare*
15. Today's standard of living is the highest ever attained
16. Sometimes, I almost wish that I could return to the womb
17. We are experiencing a decline in the quality of life*
18. Steady growth in GNP has brought increased human happiness*
19. Compared to the classics, today's music is mostly trash
20. Modern business constantly builds a better tomorrow*

[7] The questions with a '*' were removed from the original questionnaire.

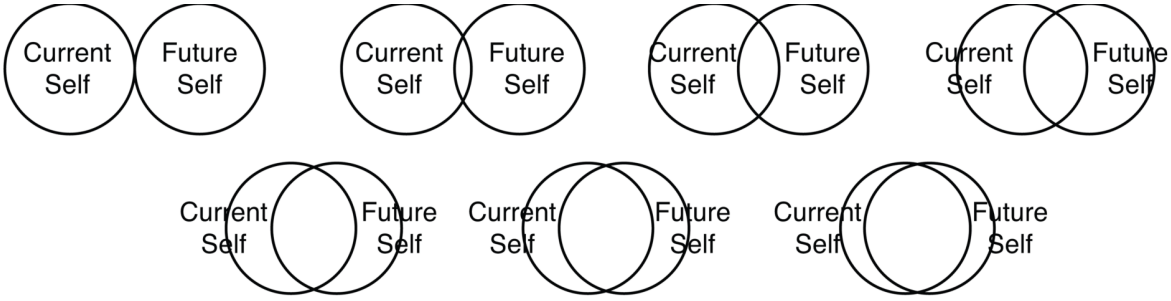
10.4 Appendix D

10.4.1 Level of future connectedness and -liking

In the first figure you don't feel connected with your future self at all, in the last figure you feel very much connected with your future self.



In the first figure you don't like your future self at all, in the last figure you very much like your future self.



10.5 Appendix E

10.5.1 General questions

What is your age? _____

What is your gender? Male Female

Since when are you registered as a student of the Erasmus University Rotterdam?

≤ 1 year ≤ 2 years ≤ 3 years ≤ 4 years > 4 years

What is your faculty?

Law (FRG) RSM ESE Philosophy (FWB) FHK Erasmus MC ISS

Do you smoke? Yes No

Do you use sunscreen when sunbathing? Yes No

Do you invest in funds, stocks, other? Yes No

Did you arrange something for retirement yet? Yes No

What is your monthly income? _____

What is your debt amount at this moment? _____

What is your saving amount approximately? _____

10.6 Appendix F

10.6.1 The manipulation towards the past

This part of the questionnaire requires you to concentrate and focus. It is very important that you take your time to fulfill the following task.

Task:

Concentrate and think of 10 years ago (2001 and before), when you had an age of approximately 10-15 years old. Try to remember and visualize exactly what you have in your life back then.

Think of 5 positive associated and 5 negative associated events that happened in that time 10 YEARS AGO and write them down on your paper. Think particular about the following:

- **the particular place, day and time of the event**
- **how long the event lasted**
- **what persons and objects were involved**

Now please write down your thoughts below in a summarized way (e.g. "vacation with friends 10 years ago" or "worked hard"). WRITE DOWN 5 POSITIVE and 5 NEGATIVE thoughts.

10.7 Appendix G

10.7.1 The manipulation towards the present

This part of the questionnaire requires you to concentrate and focus. Take your time to fulfill the following task.

Task:

Concentrate and think of what life you have right now (2011).

Try to consider and visualize exactly all aspects have in your daily life.

Think of 5 positive associated and 5 negative associated things/events you are experiencing AT THE MOMENT. Think particular about the following:

- **the particular place, day and time of the event**
- **how long the event lasts**
- **what persons and objects are involved**

Now please WRITE DOWN your thoughts below in a summarized way (e.g. "vacation with friends this week" or "study for exams this week"). Write down 5 POSITIVE and 5 NEGATIVE thoughts.

10.8 Appendix H

10.8.1 The manipulation towards the future

This part of the questionnaire requires you to concentrate and focus. Take your time to fulfill the following task.

Task:

Concentrate and think of what life you will have 10 years from now (2021 and later), when you have an age of approximately 30-35 years old.

Try to imagine and visualize exactly all aspects you expect to have in your life in the future.

Think of 5 positive associated and 5 negative associated events you think that will happen to you 10 YEARS FROM NOW. Try to pre-experience the events in detail. Think particular about the following:

- **the particular place, day and time the event would be in**
- **how long the event would last**
- **what persons and objects would be involved**

Now please write down your thoughts below in a summarized way (e.g. "vacation with friends in 10 years from now" or "will work hard"). Write down 5 POSITIVE and 5 NEGATIVE thoughts.

10.9 Appendix I

10.9.1 Chi-square test results

Table 1a: Crosstab Manipulation Past and -Future on question '€50 now or €70 in a year'.

		€50 or €70		
		In a year €70	€50 now	Total
Manipulation:	Past	7	17	24
	Future	17	12	29
Total		24	29	53

Table 1b: Manipulation Past and -Future on question '€50 now or €70 in a year'.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.598[a]	1	.032		
Continuity Correction[b]	3.486	1	.062		
Likelihood Ratio	4.690	1	.030		
Fisher's Exact Test				.052	.030
Linear-by-Linear Association	4.511	1	.034		
N of Valid Cases	53				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.87.

b. Computed only for a 2x2 table

Table 2a: Crosstab Manipulation Past and -Future on question '€50 in a year or €90 in 2 years'.

Crosstab

Count

		€50 or €90		
		.00	50 in a year	Total
Manipulation	1.00	11	13	24
	3.00	21	9	30
Total		32	22	54

Table 2b: Manipulation Past and -Future on question '€50 in a year or €90 in 2 years'.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.225[a]	1	.073		
Continuity Correction[b]	2.302	1	.129		
Likelihood Ratio	3.241	1	.072		
Fisher's Exact Test				.097	.065
Linear-by-Linear Association	3.166	1	.075		
N of Valid Cases	54				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.78.

b. Computed only for a 2x2 table

Table 3a: Crosstab Manipulation Past and -Future together on question '3 Holidays now or 7 holidays in 6 months'.

Count

		3 holidays now or 7 in 6 months		
		.00	3 days now	Total
Manipulation_past_future	.00	19	10	29
	1.00	45	9	54
Total		64	19	83

Table 3b: Manipulation Past and -Future together on question '3 Holidays now or 7 holidays in 6 months'.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.393[a]	1	.065		
Continuity Correction[b]	2.459	1	.117		
Likelihood Ratio	3.278	1	.070		
Fisher's Exact Test				.099	.060
Linear-by-Linear Association	3.352	1	.067		
N of Valid Cases	83				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.64.

b. Computed only for a 2x2 table

Table 4a: Crosstab Manipulation Past and -Future together on question 'Receive tomorrow or receive €10 to wait 6 days'.

Count

		Receive tomorrow or receive €10 to wait 6 days		
		.00	Receive tomorrow	Total
Manipulation_past_future	.00	19	10	29
	1.00	22	32	54
Total		41	42	83

Table 4b: Manipulation Past and -Future together on question 'Receive tomorrow or receive €10 to wait 6 days'.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.634[a]	1	.031		
Continuity Correction[b]	3.695	1	.055		
Likelihood Ratio	4.690	1	.030		
Fisher's Exact Test				.040	.027
Linear-by-Linear Association	4.578	1	.032		
N of Valid Cases	83				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.33.

b. Computed only for a 2x2 table

10.10 Appendix J

10.10.1 Descriptive statistics

Manipulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00 (control)	121	59,6	59,6	59,6
	1,00 (past)	23	11,3	11,3	70,9
	2,00 (present)	29	14,3	14,3	85,2
	3,00 (future)	30	14,8	14,8	100,0
	Total	203	100,0	100,0	

What is your gender?

		Frequency	Percent
Valid	Male	105	51,7
	Female	98	48,3
	Total	203	100,0

What is your faculty?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	57	28,1	28,4	28,4
	Law	11	5,4	5,5	33,8
	RSM	23	11,3	11,4	45,3
	Philosophy	97	47,8	48,3	93,5
	FHK	4	2,0	2,0	95,5
	Erasmus MC	2	1,0	1,0	96,5
	Iss	6	3,0	3,0	99,5
	other	1	,5	,5	100,0
	Total	201	99,0	100,0	
Missing	System	2	1,0		
Total		203	100,0		

Descriptive Statistics: Age and Income

	N	Minimum	Maximum	Mean
What is your age?	203	18	29	22,19
What is you montly income approximately?	200	,00	3500,00	491,0800
Valid N (listwise)	200			

10.11 Appendix K

10.11.1 Calculation of the discount rate

Christopher et. al (2008, *p. 248-249)* assume that the net present value of the discount rate can be calculated by the following equation:

$$\frac{Y}{1+\alpha_i\tau}$$

Where ***Y*** is the delayed reward, $\boldsymbol{\alpha}$ is the discount rate and $\boldsymbol{\tau}$ is the delayed time. A consumer ***i*** would choose the delayed reward over the immediate reward (***X***) if:

$$\frac{Y}{1+\alpha_i\tau} - X \geq 0.$$

They assume that the preferences of the consumer a distributed according to the logistic distribution. Then probability that a certain person will choose the delayed reward can be calculated through a logistic regression. The probability that a certain person chooses the delayed reward is:

$$F_{\text{Logit}}\left(\frac{Y}{1+\alpha_i\tau} - X\right) = \frac{e^{\frac{Y}{1+\alpha_i\tau}}}{e^X + e^{\frac{Y}{1+\alpha_i\tau}}}.$$

To calculate the probability that a consumer chooses the delayed reward, the expected utility a consumer has for the net present value of the delayed reward (***Y***) is divided by the expected utility for the immediate reward (***X***) plus the expected utility for the net present value of the delayed reward (***Y***).

The personal discount rate $\boldsymbol{\alpha}$ a person has can then be estimated by maximizing the likelihood function:

$$\mathcal{L}_i(\alpha, d_i) = \prod_{t=1}^{27}\left[F_{\text{Logit}}\left(\frac{Y_t}{1+\alpha\tau_t} - X_t\right)\right]^{d_{it}}\left[1 - F_{\text{Logit}}\left(\frac{Y_t}{1+\alpha\tau_t} - X_t\right)\right]^{1-d_{it}}$$