

Chapter 8

Summary and discussion

Summary

In this chapter the research questions and the main findings from this dissertation are briefly summarized and recapitulated. In addition, some issues concerning the measurement of impatience are discussed (again). The chapter concludes with suggestions for further research and for potential application of the experimental results to real world phenomena.

8.1. Introduction

Intertemporal choices abound. We all frequently make choices where our immediate actions have future consequences and where we have to take these consequences into account. However, we all vary with respect to the extent we are willing to take these delayed consequences into account. Moreover, we all vary with respect to what specific intertemporal tradeoffs are acceptable. Sometimes we are eager to receive outcomes immediately, while sometimes we show much more patience and are well aware of long-term consequences.

This book so far has dealt with three questions concerning such intertemporal tradeoffs. It was first investigated **when** people are more likely to be driven by their short-term interests and hence neglect future consequences. Second, it was investigated **which** people are most likely to take long-term consequences of their immediate actions into account. Finally, the question was considered whether and how behavioral regularities observed in intertemporal choice can be **generalized** to other choice domains where people have to make similar tradeoffs. This chapter summarizes the content of each chapter, discusses the major empirical findings, and presents some suggestions for future research.

Chapter 1 introduced the standard economic model as to how intertemporal tradeoffs between current and future benefits ought to be made. The Discounted Utility model (DU-model) states that rewards should be devalued (discounted) by a fixed proportion of their utility for every time interval that they are to be delayed. Further, according to economists, this devaluation should generally be equal to or at least closely related to the market interest rate. Empirical research has demonstrated several anomalies to this model. For example, people do not discount the future at a constant rate as prescribed by the model but weight time delays close to immediacy much heavier than identical delays occurring later in time. Similar problems for the DU-model have been reported with respect to the discounting of different amounts and forms of money. While small amounts are usually discounted heavily, i.e., people charge relatively high premiums for having the receipt of small payments delayed, people are rather patient, i.e., charge relatively low premiums, for having the receipt of larger amounts delayed. Further, people discount certain forms of money, such as windfall gains, much stronger than others, say permanent income. A final example for the DU-model's descriptive shortcomings is that people are much more averse to delay the receipt of (positive) outcomes than they are eager to speed-up the receipt of identical (delayed) outcomes. Subjects charge higher premiums for delay than they are willing to pay for a speed-up of the same outcome. Because for the DU-model all that matters is an object's utility and its (absolute) time delay, this behavior is incompatible with the model.

Standard attempts to trivialize these anomalies do not hold up to scrutiny. For example the claims that 'anomalies do not transfer to real world behavior where people have incentives to behave rationally in the sense of the theory' or 'individual errors cancel out at an aggregate level' are ill-founded for both theoretical and empirical reasons (see Chapter 1 for an extensive discussion). Some prominent alternatives to the DU-model (e.g., Loewenstein & Prelec 1992) are also subject to criticism. They are insensitive to situational variations in individual discount rates. Objects of identical utility should - according to these models - be discounted identically, an implication that appears implausible, in view of existing empirical evidence (see Chapter 1 for an extensive discussion). Subsequently the three above-mentioned research questions were introduced.

Yet another alternative, a framing theory linked to a model for choice behavior (the 'discrimination model') both developed by Lindenberg (e.g., Lindenberg 1980, 1986) was introduced. It was argued that this model can account for differences in discount rates for objects of identical present value, for individual differences in discount rates, i.e., some people discounting more strongly than others, and for similarities of anomalies in intertemporal choice, choice under risk and previously unrelated areas of choice behavior such as interpersonal or interspatial choice. The theory assumes that individuals are boundedly rational, that is, they have cognitive limitations. More specifically, though individuals have (unrealistically) large calculating abilities, they frame situations such that they concentrate on only one goal in a given situation and maximize utility given that frame. Possible goals relevant in an intertemporal context are 'immediacy - receive benefits as soon as possible' or 'gain - receive benefits as large as possible'.

8.2. When do people act myopically?

In Chapter 2 some of the discrimination model's postulates and implications were tested. As to the model's postulates, it was investigated whether preference depends on the salience of frames and whether this salience in turn depends on the frame's power to discriminate between choice options. That is, whether one frame clearly favors one option over the other. Simple intertemporal options, consisting of a temporal and an outcome (monetary) attribute, were presented to subjects who rated the importance of these attributes. For such simple options, attributes are equivalent to frames and these importance ratings therefore can be interpreted to measure salience. In two experiments salience served as a very good predictor for preference. Subjects being in a frame where 'immediacy' is the most important goal are more likely to prefer the sooner option and vice versa. Then, it was also investigated whether discriminatory power of frames also serves as a good predictor for preference. Evidence with respect to this postulate was mixed. In one choice problem where no frame discriminated between choice options, preference in fact was distributed evenly between options. However, in another choice problem where the temporal attribute discriminated much better than the outcome attribute - and the sooner option therefore should be preferred more often - preference between options was distributed evenly as well.

In another experiment we tried to relate preference changes between choice problems to changes in the discriminatory power of attributes. That is, if in comparison between two choice problems A and B the later and larger option is preferred more strongly in A than in B, then, in comparison to the temporal attribute, the outcome attribute must discriminate more strongly in A than in B. Here, preference and discriminatory power of frames were correlated, as predicted, but this correlation did not reach significance and the predicted preference reversals did not occur. Thus, the question remains open whether the absence of effects is due to a failure of the experimental design or a descriptive shortcoming of the model. Because the other predictions of the model were by and large confirmed by the data, the first explanation appears to be more valid, but this issue has not been settled in this dissertation.

To test several implications of the model's postulates, discriminatory power and salience of frames were manipulated indirectly. To do so, some experiments from consumer research on the effect of the choice context on preference were adapted. Most concepts of rationality require that the relative attractiveness between two options remains unaffected by what other options are available. However, according to the

discrimination model such an addition of other options might alter the discriminatory power of frames. Consequently, the salience of frames and preference between options are altered as well, a prediction compatible with results from consumer research on context effects. In a series of experiments it was demonstrated that the addition of options that alter the discriminatory power of frames in fact changes preference such that the frame discriminating best between options becomes decisive and the option preferable with respect to this frame becomes preferred more often.

Chapter 3 turned to the more specific question which frames are associated with myopic behavior and under which frames long-term considerations are more important. It was proposed that hedonic aspects of consumption are more likely to lead to a frame where immediate receipt of the goods is salient than utilitarian considerations. Since hedonic usage of a good provides direct utility to the decision maker, it can be imagined better, resulting in a stronger feeling of deprivation when one does not possess an object. Consequently, delaying hedonic goods is more aversive than delaying utilitarian goods and people prefer to receive the former sooner. In three experiments, subjects in fact preferred to receive hedonic goods sooner than utilitarian goods. In one of these experiments the effect of hedonic usage on salience of goals favoring immediate receipt was so strong that it could even outweigh utility (i.e., monetary) differences. That is, though the utilitarian good was more attractive for subjects – because its selling price was higher – subjects nevertheless preferred to receive the hedonic good sooner, an effect running counter to the Discounted Utility model as well as its major descriptive rival, the hyperbolic discounting model.

In addition, it was investigated whether the same preference ordering between hedonic and utilitarian goods also holds when subjects do not have to state which good they would like to receive sooner, but have to state adequate monetary charges that would compensate them for the aversive feeling of delaying the receipt of an attractive good. From a framing point of view, the latter measure, though often taken to be equivalent with the former in the literature, might lead to different results because asking for monetary amounts inclines subjects to think in terms of utilitarian aspects (money) even when hedonic goals are considered. For example, subjects may reflect about the appropriateness of the compensation charge or alternative usage of the money. Such utilitarian aspects should wipe out or even reverse the difference in impatience between hedonic and utilitarian goods. The results showed that, in choice situations involving compensation charges effects for hedonic goods were indistinguishable from the effects for utilitarian goods.

Chapter 4 again investigated intertemporal preferences for hedonic and utilitarian goods but this time it was studied how sensitive preferences are to a vivid presentation of the goods. Though vividness, contrary to our intuitions, has little effect on preference and judgments in general, several researchers suggested effects of vividness in intertemporal choice. However, there is disagreement among different theorists as to whether vividness raises or lowers impatience for both and whether vividness affects both goods similarly or not. We argued that if vividness stresses the hedonic aspects of consumption experience, it should raise impatience for hedonic goods more strongly than for utilitarian goods. Further, in analogy to Chapter 3 we also expected impatience for both goods to depend on the way impatience is measured.

First, an experiment was designed to test whether vividness affects hedonic and utilitarian goods equally in choices about which good to receive sooner. It turned out that for such choice situations, vividness raised the immediate attractiveness of hedonic goods

much more strongly than of utilitarian goods. As in Chapter 3 this effect disappeared when subjects had to determine adequate monetary compensation charges for delaying both goods. In fact, in this experiment compensation charges for utilitarian goods were even higher than for hedonic goods.

8.3. Who acts myopically?

While the former three chapters dealt with the question when people are likely to behave myopically, Chapter 5 investigated which people are most likely to behave in a shortsighted way. Since patience is advantageous in numerous situations and this kind of ability is learned to a large extent in the parental household, many parents will try to induce adequate preferences within their children. That is, they will try to raise their children such that they are able to overcome their natural tendency to behave shortsightedly. However, parents differ with respect to ability, incentives and restrictions to teach patience to their children. For example, parents who are held more responsible for the behavior of their children have higher incentives to socialize them properly. Having many siblings at home decreases parental time per child and thus decreases the opportunities to teach children self-control. Using data containing detailed retrospective information about the raising of the respondents and a psychological scale to measure how strongly respondents take future consequences into account, it was demonstrated that indeed higher incentives for parents to socialize children 'properly' lead to more patient respondents. Furthermore, parents who serve as a better model for patience, due to educational achievements and professional requirements, also produce more patient offspring. Little evidence was found for an effect of restrictions, such as family composition. There was evidence that parental socialization techniques, such as the strictness or parental stimulation of children, affect patience. Respondents reporting to be raised more strictly and to grow up with more stimulation appeared to be more concerned about future consequences.

Investigating potential causes for patience is only valuable, if differences in patience have consequences for actual behavior. Hence, patience as measured by the psychological scale was also used to predict potential consequences of myopic behavior in a variety of settings, e.g., health behavior, engagement at school and university, and engagement in potentially risky behavior. In all of these domains, subjects who are classified as more patient report to behave more prudently. That is, they consumed less alcohol and fewer drugs, were less likely to smoke and more likely to engage in sporting activities, they did their homework at school more carefully, followed extra courses at the university, and finally were much less likely to show deviant behavior in a variety of settings.

While these results were obtained by using a psychological scale measuring concern for future consequences, patience is usually measured in intertemporal choice experimentally by calculating discount rates from delaying hypothetical or actual monetary payoffs. Because Chapters 3 and 4 demonstrated that asking subjects to translate their feelings of impatience into terms of monetary payoffs does affect their framing and consequently impatience, it is questionable whether this measure actually deserves its current prominent position. To investigate this point further, it was also tested whether parental socialization also affects patience if it is measured by the delay of hypothetical amounts and whether this measure serves as an as good predictor for actual behavior as the psychological scale.

The results confirm our suspicion. Patience, measured by the monetary measure turned to be much less predictable than when measured by the psychological measure and the former also predicted actual behavior much worse than the latter. Further, there was no relation between both measures of patience. Not only were there no correlations between the psychological scale and the scale for delaying monetary outcomes, but no single factor predicted patience on both scales. For example, higher parental status reduced children's patience measured by the psychological scale, but it did not affect patience as measured by the money-scale. These results corroborated results from Chapters 3 and 4 and underlined that different measures for impatience not only reflect different kinds of impatience, but also that calculating discount rates from the delay of monetary amounts omits important aspects of intertemporal choices. Framing effects thus appear to be important also for measurement instruments.

8.4. Generalization of effects

Chapter 6 compared normative concepts and empirical results in choice under risk and intertemporal choice and demonstrated the close analogies between the normative axiomatic formulations as well as their almost identical empirical violations. It was argued that these similarities reflect general behavioral tendencies: people evaluate outcomes against a multi-dimensional reference point and prefer them to be as large as possible, to be certain, to be obtained 'now', to occur to themselves and to occur 'here'. Deviations of any of these attributes from this ideal state lead to a devaluation of the object's absolute value. Therefore, the empirical regularities observed in choice under risk and intertemporal choice are not restricted to these preference dimensions but can be generalized to interspatial and interpersonal choice. Moreover, this devaluation should be similar across preference dimensions and therefore result in similar empirical regularities and discount functions for all preference dimensions.

Chapter 7 replicated the above-mentioned regularities for choice under risk and intertemporal choice and empirically tested their generalization to interspatial and interpersonal choice. To do so, first, decision-theoretic research on interpersonal and interspatial choice was reviewed briefly and then some space was devoted to the discussion of what might be adequate stimuli for both preference dimensions. For interspatial choice, shops and supermarkets (varying with respect to items-in-store) that could be opened or closed down at varying spatial distance were used as stimuli. For social distance, a metric measure was created, making this dimension roughly comparable to the easily quantified dimensions of risk, time and space. For this metric measure fictive characters defined by social-economic status, age, hobbies, political orientation, and nationality were created. These dimensions were weighted according to a pretest. Social distance for each character was determined by the weighted sum of distances for each dimension. For example, in the pretest for a variety of settings, hobbies were rated as three times as important for social closeness as nationality. A character being identical to what was considered to be the 'average subject' with respect to hobbies but different with respect to nationality thus had a lower social distance than a character being identical with respect to nationality and different with respect to hobbies. The social distance created in this way was compared with the actual perception of the character's social distance by the subjects.

It turned out that many effects observed in intertemporal choice and choice under risk could also be observed in interspatial choice. Examples are the sign effect and the

common ratio effect. Therefore, there is evidence for a general tendency to discount outcomes for several preference dimensions similarly. Moreover, since for the spatial dimension common ratio effects were observed but common difference effects were not, the discount function for spatial distance appears to be exponential instead of hyperbolic as for intertemporal choice or S-shaped as for probabilities.

For interpersonal choice results were much less clear. First, tests of the subjects' perception of the stimuli revealed that males perceived the stimuli different than intended. Therefore, the stimulus set was slightly adapted. For females, perception of stimuli was much more in accordance with the intentions. However, for females none of the predicted effects could be demonstrated while for males results were much more in accordance with our predictions. For example, we observed common difference and common ratio effects for the social dimension, which can adequately be explained by assuming a hyperbolic discount function for social distance. Future research should investigate whether this result is an artifact due to misspecification of the stimuli for males or whether there is in fact a discrepancy in the discounting of social distance between males and females.

8.5. Measuring impatience

A reoccurring theme in this dissertation is how to measure impatience and whether different measures of impatience lead to identical results. Standard measures of impatience, such as the delay of hypothetical amounts and stating adequate monetary compensation charges, turned out to be much less reliable and to lead to different results than simply asking subjects which of two outcomes they would like to receive sooner. Framing theory would predict that making the subject think in terms of money would direct attention from hedonic to utilitarian aspects and thus reduce impatience. Thus, measurement issues should be treated as theoretical issues and be covered by the same theory that is used to predict the measured effects.

Besides these theoretical considerations, solely measuring impatience by calculating discount rates from compensation charges for delaying monetary amounts is unreliable, as we have seen. It may be very difficult for subjects to state adequate compensation charges for situations they have no experience with, as reported in a previous experiments on the delay/speed-up asymmetry. There, Loewenstein (1988: 208) commented on the striking result that on average subjects valued a delayed dinner slightly more than an immediate: 'This result again testifies to the unimportant role played by time delay when subjects are simply asked how much they would pay to consume at different points in time'.

8.6. Suggestions for future research

This section summarizes research problems not sufficiently dealt with or neglected thus far in this book, and it suggests applications for some of its results. We begin with some open questions.

First, in Chapter 2 we tried to relate changes in preference between choice problems to changes in the power of frames to discriminate between choice options. It was not possible to demonstrate such an effect. This may be due to the fact that the choice problems under study were chosen such that, contrary to the intentions, no preference change occurred. That is, preference for the sooner option statistically was not

stronger for the problem ' $f100$ now vs. $f110$ in 4 weeks' than for the problem ' $f 100$ in 10 weeks vs. $f110$ in 14 weeks'. It appears useful to again let subjects independently rate the difference in attractiveness for both the temporal and outcome attribute but shift both options in the second choice problem further into the future such that changes in preference occur. If the theory is correct, these preference changes should be correlated with changes in the discriminatory power of attributes. Further, also in Chapter 2, for a choice set consisting of two options, adding an option that is almost indistinguishable from one of the initial options, raised preference for the distinct option only marginally. It is therefore not clear, whether or not the hypothesis is confirmed. This experiment should be replicated to clarify this issue.

In the following chapters it was investigated when people are likely to behave myopically and who is most likely to behave in such a way. A natural follow-up would be to relate these findings to each other. That is, to use the personal measures for impatience introduced in Chapter 5 as predictors for the intertemporal choices between consumer goods presented in Chapters 3 and 4.

In Chapter 7 it remained unclear whether the discrepancy in results for social discounting between males and females - absence of results for females, predicted effects for males - was due to sexes' different discounting of social distance or due to a misspecification of the stimulus set. Further research with respect to this question seems warranted. In addition, Chapter 7 did not investigate all regularities specified in Chapter 6. For example, range effects were completely left out of the experimental design as were the anomalies equivalent to the delay/speed-up asymmetry in intertemporal choice. Here, further research is needed as well. Further, it is interesting to investigate whether the same personal correlates that affect patience do also affect risky and interspatial preferences. Since the arguments put forth in Chapter 5 refer to preference formation in general, one would expect similar personal characteristics to affect preference for all three dimensions. A related question not tackled in this book is whether the same subjects are impatient, risk-averse, and prefer benefits to occur here. That is, to investigate more closely whether not only discount functions for these dimensions are similar, but whether the temporal, probability and spatial attributes can in fact be substituted for each other without altering preference. Consider a subject who prefers to receive ($f100$; now) over ($f110$, in four weeks). Does this preference increase the likelihood to prefer the gamble (75 ; 1) over the gamble (100 ; $.8$)? A final question with respect to the similarities between these preference dimensions is the effect of presenting multi-attribute choices, consisting of three attributes, e.g., outcome, temporal delay, and spatial distance, to subjects. Previous research in intertemporal choice suggests that adding a third attribute, e.g., adding probabilities to options consisting of outcome and temporal delay, results in relatively less discounting than the discounting caused by each attribute individually. Similar effects could be expected when the probability attribute is replaced by a spatial attribute.

Turning to applications to real world phenomena, it would be useful to replicate the results concerning impatience for hedonic and utilitarian goods using actual choices. Chapters 3 and 4 demonstrate that people are more likely to behave impatiently when hedonic consumption experience is important. Hence, myopic behavior should be more frequent in such situations, especially when goods are presented vividly and choices do not involve apparent financial trade-offs. For example, one would expect (excessive) credit card shopping to occur more often when hedonic goods are involved. Further, one would expect people to engage in activities with long-term negative consequences

especially when immediate hedonic consumption is traded for such long-term consequences.¹⁴⁰ Another implication is that it is easier to stick to one's long-term consumption plan when utilitarian considerations are involved than when hedonic aspects play a role. For example, it might be easier to save for utilitarian than for hedonic goods, because saving for the latter creates higher levels of deprivation. Hedonic goods therefore should be more likely to be bought on credit.

While these considerations pertain to the situational characteristics of temporal discounting, it is of course also possible to apply the personal characteristics demonstrated in Chapter 5 to different areas. In many economic analyses, differences in time preference strongly affect behavior. Hence, the effects of patience on behavior in such settings should be investigated in more detail than it has been done in this book. For example, one would expect patient people to save more and to display different behavior with respect to fertility and deviant behavior.

Although in this dissertation much emphasis has been put on the usefulness of farsighted behavior, it remains an open question as to whether farsightedness is always valuable. For example, hesitation in many respects seems to be opposed to impatience, likewise curiosity in some respects seems to be related to impatience. Future research might be devoted to these relations in more detail.

A final noteworthy point is that although in this dissertation much emphasis has been put on 'anomalies' to rational choice theory, framing theory is compatible with the notion that much, but not all, behavior is rational and in fact adequately modeled by standard microeconomic theory. Because people maximize utility given their frame, in market situations where 'gain' is by far the most prominent goal, predictions from economics and framing theory converge. This possibly also accounts for the fact that in experiments investigating the functioning of markets, predictions of economic theory are regularly borne out, while in individual decision making 'irrational' behavior is observed much more often (see Kagel & Roth 1995 for overviews). Prices and quantities in such market experiments usually quickly converge to equilibrium solutions specified in advance. However, in such cases the situation is well structured for subjects: they have to maximize some experimental credits which in turn are converted to actual payoffs. Experimental credits and consequently payoffs clearly form the most salient goal for subjects in such situations. In experiments investigating the consistency of individual preferences, numerous deviations from rational models have been reported, some of which are summarized in this book. According to framing theory this is due to the fact that, through experimental manipulations, the salience of goals shifts and hence choices (or 'preferences') change. Utility-maximizing rational behavior is maintained given a certain frame but not necessarily between frames.

¹⁴⁰ Addictions appear to clearly confirm this suggestion. However, since for additive goods consumption reinforces itself, addictions differ from choices between consumer goods as investigated in this book.

