Aarhus Survey

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Abstract

This document gives a brief overview of the design and measures of the "Aarhus survey", a survey consisting of several incentivized online tasks, self-reported survey questions, and psychological scales. The survey was administered to first-semester students in business and social science programmes at Aarhus University in 2013 and subsequently linked with data from the university student registers.

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1 Introduction

We conducted an online survey experiment to which all first semester students in business and social science programmes in Fall 2013 were invited. In this study, we used survey questions, psychological scales and simple, incentivized measures from experimental economics to elicit a broad set of behavioral characteristics.

Among the measures that we are interested in are risk aversion, impatience, aversion to losses, willingness to engage in competition, mental accounting, self-regulation strategies, expectations about future outcomes, overconfidence, and some tasks related to cognitive skills. The behavioral measures were subsequently linked with data from the student registers at Aarhus University.

Related literature Several other studies use a related battery of small experiments and survey questions, link them to outcomes, and examine the correlation between different behavioral measures and outcomes. Burks et al. (2008) conduct a series of small experiments among truckers and relate them to outcomes. Burks et al. (2015) use a similar set of questions as Burks et al. (2008), but administer them to 100 college students. Reuben, Sapienza and Zingales (2008) conduct the "Templeton-Chicago's MBAs Longitudinal Study". Elicited measures include cognitive ability, time-, risk- and social preferences, competitiveness and certain personality traits.

Dean and Ortoleva (2014) elicit a battery of behavioral phenomena (short-term discount rates, small stakes risk aversion, present bias, loss aversion, the endowment effect, aversion to ambiguity and compound lotteries, the common ratio and common consequence effects, and sender/receiver behavior in trust games), and test how they are interrelated.

A range of other studies examines the predictive power of personality traits used mainly in psychology and compares these to economic preferences. Burks et al. (2015) observe that some aspects of the Big Five trait of Conscientiousness, namely how hardworking a person is, as well as the ability to think strategically, predict college success. Becker, Deckers, Dohmen, Falk and Kosse (2012) examine the correlation between measures of preferences and personality traits and their predictive power using different data sets, such as the German GSOEP and experimental data. They find only little correlation between the measures. When ex-

amining their predictive power, they conclude that preferences and personality traits are complements in predicting outcomes. Borghans, Duckworth, Heckman and ter Weel (2008) review studies that relate economic preferences and personality traits to outcomes. They provide evidence that both cognitive ability and personality traits are important predictors of outcomes (see also Duckworth and Seligman (2005) and Almlund et al. (2011), who observe similar correlations). Anderson et al. (2011) examine the predictive power of personality traits (Big Five) vs. elicited preferences for outcomes and observe that the personality traits have a stronger predictive power than preference measures.

2 Studies that build on the Aarhus survey

Behavior often deviates from standard predictions because individuals evaluate the consequences of choices separately (narrow bracketing) rather than jointly. The main existing theories classify different narrow bracketing phenomena as (i) choice errors caused by cognitive limitations, or (ii) strategies to achieve self-control. In Koch and Nafziger (2018a), we use data from the Aarhus survey to examine whether different phenomena of narrow bracketing correlate with each other and with individual characteristics, such as cognitive skills and self-control, as predicted by the complementary theories that classify particular narrow bracketing phenomena as a choice error (*choice bracketing*) or as a response to self-control problems (*motivational bracketing*). We find consistent evidence for (ii): mental budgets and narrow goals are related to each other and to measures of self-control, but are distinct from other forms of narrow bracketing. Evidence for the complementary theory (i) is less consistent: few choice bracketing phenomena are related to each other and to cognitive skills. In Koch and Nafziger (2018b), we study in an online, real-effort experiment how the bracketing of non-binding goals affects performance in a work-leisure self-control problem. The treatments vary whether subjects set daily or weekly goals for how much to work over a one-week period. Our theoretical model predicts that subjects with daily goals set higher goals in aggregate and work harder than those with weekly goals. Our data support this prediction. In treatments that add an externally set commitment to spend less than a minute each day to get started working, performance deteriorates because of high dropout. The empirical analysis makes use of some measures collected in the Aarhus Survey, from which

part of the subjects in the goal bracketing experiment were recruited.

3 Design and Measures

3.1 Administering the survey

We conducted the study at Aarhus University, Denmark. The study ran online using the Qualtrics survey software, allowing participants to switch between English and Danish instructions. Participants could use their own desktop, notebook, or touchpad computer but not a smart phone (a software filter prevented access with the latter). The full instructions of the survey are reproduced in Appendix C.

All first semester students in business and social science programmes in Fall 2013 received an email invitation informing them that they could earn money by clicking a link and completing an online questionnaire. Students who did not start, or who started, but did not complete the survey, received reminders. Students were informed that the study takes approximately 60 minutes. Upon accessing the study, participants were provided an overview of the study and procedures, and were asked for consent. Participants had to complete the entire survey to receive payment from several incentivized tasks in addition to a fixed payment of 50 Danish kroner (kr.). The survey took around one hour and average earnings were 148 kr. ($25 at the time). Participants who completed the survey could earn another 200 kr. by participating in a follow-up study that elicited time preferences.

Participants were informed how payments would be made 2-6 weeks after the experiment by bank transfer via the Danish payment system through which public bodies and companies can send money to a person using their social security number. This payment system is standard in Denmark and was required by Aarhus University to fulfill its duty to report payments to the tax authorities. Participants were reminded that earnings are pre-tax. We encouraged participants to write down our email address in case of questions about the payment procedure.

The email invitation was sent out (in 5 consecutive waves) to 2971 first year students at the Aarhus School of Business and Social Science. Waves 4 and 5 also addressed students who were previously invited during waves 1 and 2, but did not start the study (46 students

0	0	0	1	1
0	0	0	0	0
0	0	1	0	1
0	0	0	0	0
1	0	0	1	0
0	1	1	0	1

Figure 1: Task: count the number of zeros in tables like this one

received a double invite). A total of 645 participants completed the survey (21% response rate); of these, 314 participants also completed the follow-up study eliciting time preferences. A further 874 participants started, but did not complete the experiment.

Average earnings were 148 kr ($25 at the time) for the survey study and an additional 200 kr. for those participants who completed the follow up study eliciting time-preferences. Participants came from different undergraduate business and social sciences programs, including law, economics, a variety of business degrees (some in combination with e.g. engineering, communication, or languages), psychology, and political science.

3.2 Questions and Tasks

The study consisted of several incentivized parts and a questionnaire.

3.2.1 Competition

This part of the study is based on Niederle and Vesterlund (2007) – with some adjustments. Participants completed a task based on Abeler et al. (2011) that required them to count the number of zeros in tables with zeros and ones (see Figure 1). In contrast, Niederle and Vesterlund (2007) use a simple number addition task. Yet, both tasks are similar in that they require no prior knowledge, they are boring, and performance is a priori not gender specific.

In the first stage, participants had three minutes to count as many tables as possible and earned 0.5 kr. (about $0.08) per table. The task and payment structure were explained to students before they started counting.

Participants were then informed that they will again have 3 minutes to count the number of zeros in up to 40 tables. Before counting, they could choose whether to be paid based just on their own performance, or to compete with others' performance. If they chose the first ption ('No Competition'), they received 0.5 kr. per correctly counted table. If they chose the second option ('Competition'), they received 1 kr. per correctly counted table if they correctly counted more tables than one randomly chosen participant in that survey wave did in round 1. In case of a tie, each would get paid 1 kr. per correct table with probability 50 percent and otherwise earn nothing for this task.

Niederle and Vesterlund (2007) have an additional stage in which participants always perform under the competitive tournament. When having the choice between 'Competition' and 'No Competition', performance is then evaluated against the performance of another participant from the pure competition task, and not from the piece rate task as in our case. Given that our study was conducted online and included several other tasks, time for this stage was limited. hence, to simplify procedures, we choose to let participants compete against the performance of a randomly drawn participant from round 1. Our design has the slight disadvantage that if a participant chooses to compete, he competes against somebody who performed under the piece rate. Yet, our design preserves the main feature that beliefs about others' entry decision does not affect a participant's choice between "Competition" and "No Competition".

After the choice between 'Competition' and 'No Competition', and before doing the actual counting task, we also asked participants to rank their performance in round 1 relative to the performance of the other participants in round 1. Again this simplifies the design of Niederle and Vesterlund (2007). In their last task, they let participants choose the compensation scheme for past piece-rate performance to control for overconfidence and risk preferences. We measure risk preferences separately in the next task.

3.2.2 Time preferences

After the competition part, we asked participants whether or not they wanted to participate in a follow-up study, which required them to make 5 decisions already during the online survey experiment (week 0) and to complete an online follow-up survey on the same week day in each of the following two weeks (weeks 1 and 2). This required about 60 minutes in

total. Subjects who completed the time preference part received 200 kr. in addition to the other payments from the survey experiment (paid out together). To elicit time preference parameters, we follow the design of Augenblick, Niederle and Sprenger (2015). Figure 2 summarizes the timing.

Week 0:

- Subjects first have 3 minutes to count the number of zeros in tables filled with 0s and 1s. They earn 0.5 kr. (about $0.08) per correctly counted table. The task and the payment structure are explained to students before they start counting.

- Subjects are then informed that in weeks 1 and 2, they will have to count zeros in a number of tables. In each week, subjects first have to complete 40 tables. In addition to these 40 tables, they have to complete a certain number of tables determined by their choices.

- Specifically, subjects choose how many tables to complete in each week by making work schedules. Each subject states how many tables he wants to complete one week from today (week 1) and how many tables he wants to complete two weeks from today (week 2). Subjects make 5 work schedules in total. They chose how to allocate work using drop-down lists. There are 5 different possible exchange rates between effort in week 1 and week 2, which are 1:1.5, 1:1.25, 1:1, 1:0.75, and 1:0.5. For example, the exchange rate 1:1.5 states that every table a subject completes in week 1 (e_1) reduces the number of tables he has to complete in week 2 (e_2) by 1.5. That is, for a given exchange rate $1 : 1/p$ a subject faces the following intertemporal effort-"budget" constraint:

$$e_t + \frac{1}{p}\, e_{t+k} = m,$$

  where $m = 120$ is the total number of tables to complete (in week 1 "currency").

- Each subject is informed that one of his 5 work schedules may be selected as the "work schedule that counts", and that he then has to complete the number of tables specified in this work schedule to be eligible for payments. Subjects are told that they will be provided with more detailed information in week 1.

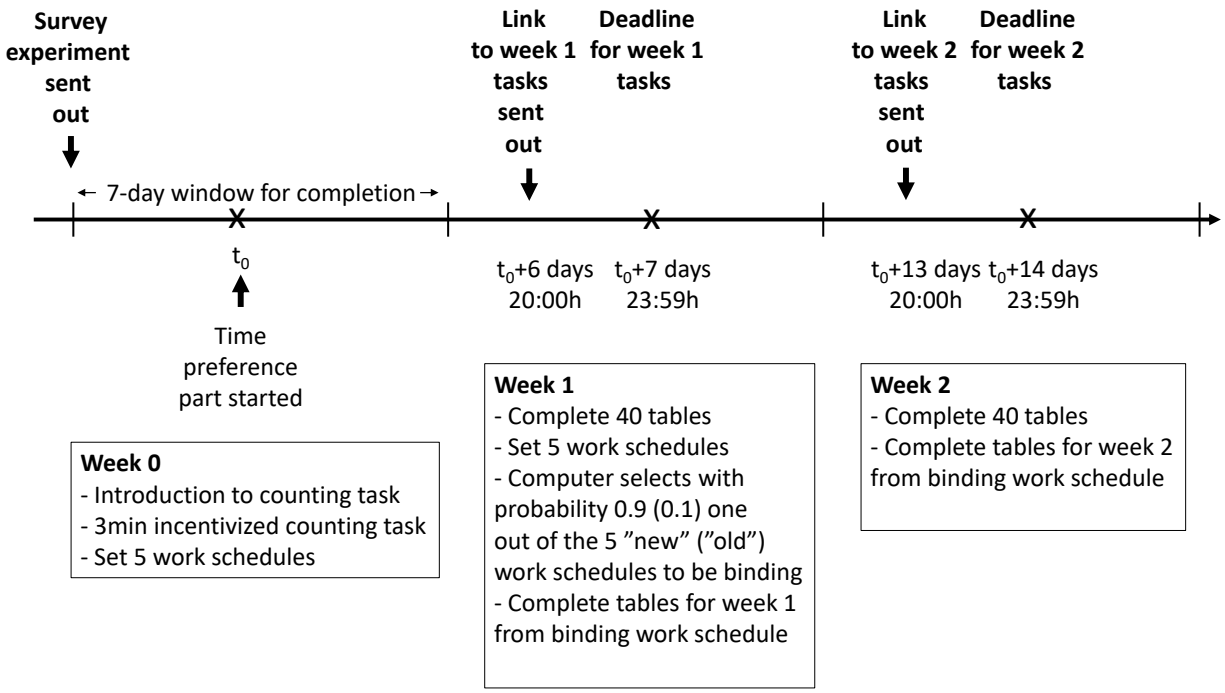


Figure 2: Timing of Time Preference Elicitation

Week 1:

- Subjects receive an email with a link to the task (at 20:00h on the day before the deadline). When they follow the link, subjects first have to complete the 40 mandatory tables for week 1. Thereafter, they are given the opportunity to revise their work schedules from week 0.

- Specifically, they are asked to make 5 new work schedules. Further, they are informed that there is a 90 percent probability that one of the 5 “new” work schedules will be selected as the “work schedule that counts”, and that there is a 10 percent probability that one of the 5 “old” work schedules from week 0 will be selected as the “work schedule that counts”.

- After making their choices, subjects are informed which work schedule is binding. They then complete the tables required for week 1 by their work schedule. Subjects have until 23:59 h to complete these tables. During this time, up to two reminders are sent to subjects who have not yet completed the task.

Week 2:

- Subjects receive an email with a link to the task (at 20:00h on the day before the deadline). When they follow the link, subjects first have to complete the 40 mandatory tables for week 2.
- Then they have to complete the tables required for week 2 by their work schedule. Subjects have until 23:59h to complete these tables. During this time, up to two reminders are sent to subjects who have not yet completed the task.
- If they complete all required tables in weeks 1 and 2 in time, they receive 200 kr.

Our procedure differs in a few, minor details from Augenblick et al. (2015). First, in our study, all phases of the experiment are conducted online. In Augenblick et al., subjects are present in the lab in week 0. Second, we use the counting task by Abeler et al. (2011) rather than the transcription and Tetris games Augenblick et al. use.
Our procedure differs in a few, minor details from Augenblick et al. (2015). First, in our study, all phases of the experiment are conducted online. In Augenblick et al., subjects are present in the lab in week 0. Second, we use the counting task by Abeler et al. (2011) rather than the transcription and Tetris games Augenblick et al. use. Third, subjects in our study revise their work schedules after completing the fixed work load of 40 tables. In Augenblick et al. subjects revise before the fixed work load. Fourth, we reformulated the instructions to make them simpler to understand. In particular, we reduce complexity of the instructions by telling subjects in week 0 (to avoid deception) that one of their work schedules may be the one that is binding and that they will get further information on the work schedules in week 1. In week 1, we explain fully the possibility to revise work schedules and the procedure for determining which work schedule is binding.

Estimation procedure. With present-biased preferences (Laibson 1997), the utility of the individual in period t is given by:

$$u_t + \beta\left[\delta u_{t+1} + \delta^2 u_{t+2} + \dots\right],$$

where u_t is the instantaneous utility in period t, δ is the standard exponential discount factor, and $\beta \in (0, 1)$ is the present bias. For instance, if $\delta = 1$, the period-0 incarnation of

the individual (self 0) weighs future utilities u_1 and u_2 equally; but the period-1 incarnation of the individual (self 1) puts a larger relative weight on u_1 by discounting u_2 with $\beta < 1$, reflecting his present bias. As a consequence, the individual faces a self-control problem. Suppose, for example, u_1 reflects the effort costs of the individual and u_2 some future benefit from effort. Then, self 0 wants higher effort than his future self 1 actually provides. The reason is that for the future self the immediate costs of effort feel larger than they do for self 0, who discounts the future costs by the present-bias factor $\beta < 1$.

We estimate for each subject the present bias β following the procedure of Augenblick et al. (2015), and refer the reader to their paper for details. Identification problems and assumptions are discussed in their paper. Specifically, identification is problematic if subjects have no variation in allocations across the different exchange rates in some weeks. Following Augenblick et al. (2015), we exclude such subjects. This gives us 293 observations for *Present Bias*, out of the 314 subjects who participated in this part.

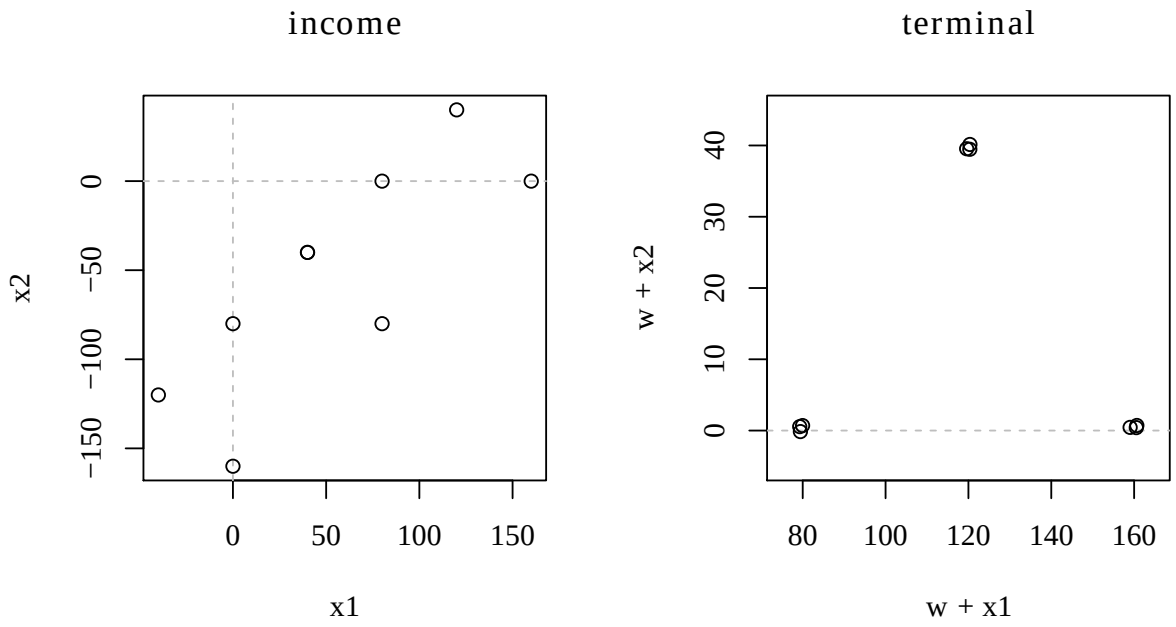
3.2.3 Risk preferences

We elicit reference dependent preferences using multiple price lists, with the parameters given in Tables 1-3. We list the nine lotteries grouped by terminal outcome (*x1Term* and *x2Term*) and we refer to these groupings as 'configurations'. Figure 3 depicts the lotteries as points in (terminal) outcome space $(w+)$ (x_1, x_2).

Upon entering this part of the survey, subjects learned that they will face 9 price lists. In each, they had to state which of two alternatives, A and B, they prefer. Under A, subjects got an amount of money for sure. Under B, the amount of money they received was uncertain, and it was equally likely that the subject received x_1 kr. or x_2 kr., where $x_1 > x_2$. Each price list had 21 choices. The amount under alternative B was fixed, while the amount under alternative A ranged from x_2 to x_1. We induced a unique switching point by asking subjects to mark the lowest sure amount of money at which they prefer alternative A over B. The computer automatically ticked alternative A for all higher sure amounts and alternative B for all lower sure amounts. Subjects could change their choice as often as they wanted before submitting an answer.

Some lotteries displayed losses. For this reason, each question had an endowment w kr. from which any loss was deducted and to which any gain was added. Endowments were displayed

Figure 3: The Lotteries in the Outcome Space



at the top of the page for each question, separately from the outcomes.

After subjects completed all 9 price lists (in randomized order), the computer randomly selected one of them as the 'question that is paid'. Each price list was equally likely to be selected. For the 'question that is paid' the computer randomly selected one of the 21 rows as the 'row that counts'. Each row was equally likely to be selected. For the 'row that counts' the computer checked whether the subject preferred alternative A or B. If he preferred A, then he gets the sure amount listed in that row. If he preferred B, then the computer randomly selected outcome x_1 or x_2. In addition, the subject got the endowment w associated with the price list.

The 9 price lists allow us to estimate the parameters of a value function of the form (Köbberling and Wakker 2005):

$$v(x) = \begin{cases} \frac{1-e^{-\mu x}}{\mu} & \text{if } x \geq 0 \\ (\lambda+1)\left(\frac{e^{\nu x}-1}{\nu}\right) & \text{if } x < 0. \end{cases} \tag{1}$$

The value function is linear if $\mu = \nu = 0$, s-shaped if $\mu, \nu > 0$, inverted s-shaped if $\mu, \nu < 0$, and globally concave if $\mu \geq 0 \geq \nu$. A subject is loss averse if $\lambda > 0$ and gain seeking if $\lambda < 0$. The estimation procedure follows Epper, Koch and Nafziger (2018) and is summarized also

in Appendix A.

Table 1: Lottery Configuration 1

type	lotteryId	w	x1	x2	p1	x1Term	x2Term	ev	evTerm	spread
loss	1	80	0	-80	0.50	80	0	-40	40	80
mixed	2	40	40	-40	0.50	80	0	0	40	80
gain	3	0	80	0	0.50	80	0	40	40	80

Table 2: Lottery Configuration 2

type	lotteryId	w	x1	x2	p1	x1Term	x2Term	ev	evTerm	spread
loss	4	160	-40	-120	0.50	120	40	-80	80	80
mixed	5	80	40	-40	0.50	120	40	0	80	80
gain	6	0	120	40	0.50	120	40	80	80	80

Table 3: Lottery Configuration 3

type	lotteryId	w	x1	x2	p1	x1Term	x2Term	ev	evTerm	spread
loss	7	160	0	-160	0.50	160	0	-80	80	160
mixed	8	80	80	-80	0.50	160	0	0	80	160
gain	9	0	160	0	0.50	160	0	80	80	160

3.2.4 Narrow bracketing

ABCD lottery The questionnaire included the ABCD lottery question by Tversky and Kahneman (1981). Participants faced the following pair of concurrent decisions. They were asked to first examine both decisions.

1. Choose between (before answering, read Decision 2):

   A winning 240 kr.

   B a 25% chance of winning 1000 kr. and a 75% chance of not winning or losing any money.

2. Choose between:

   C losing 750 kr.

D a 75% chance of losing 1000 kr., and a 25% chance of not winning or losing any money.

Participants were explained that for this question the computer randomly selects one participant as the 'participant who is paid'. Both decisions would be paid for this participant. The participant who is paid would be given an extra 100 kr. on top of his other earnings to cover any possible losses. We listed the 100 kr. endowment separately from the lottery so that the outcomes of the lotteries in the second decision appeared to be in the loss domain. Tversky and Kahneman (1981) report for different hypothetical stake sizes that between 60-73% of participants choose AD – a choice that is first-order stochastically dominated by BC. Rabin and Weizsäcker (2009) replicate the experiment with real stakes and find that 28-34% violate dominance. With large hypothetical stakes they find that 60% violate dominance.

Small scale insurance Participants were asked which kind of small scale insurance (cycle, phone, baggage, travel, computer/labtop) they have ever bought. Buying small scale insurance can be explained by first order risk aversion, such as expectation based reference dependent preferences in conjunction with narrow bracketing (Sydnor 2010).

Topical account This question builds on the "lost ticket versus lost money question" by Kahneman and Tversky (1984). We asked participants the following two questions. A 5-point Likert scale was used.

- Imagine that you decided to go to a concert. You paid the admission price of 100 kr. for a concert ticket. As you enter the concert hall you notice that you have lost the ticket. Would you pay 100 kr. for another ticket?
- Again, imagine that you decided to go to a concert. The admission price is 100 kr. As you enter the concert hall you notice that you have lost 100 kr. Would you still pay 100 kr. for a ticket for the concert?

Kahneman and Tversky (1984) observe that many participants are willing to pay for a ticket if they just lost 100 kr. But much fewer a willing to pay 100 kr. if they lost the ticket. They suggest that when buying a ticket, people open a narrow, topical account for the play to which the cost of a lost ticket will be posted but not the lost money.

Self-control and mental accounting We included two questions on motivational bracketing. Heath and Soll (1996) document how people control their expenditures in mental accounts for narrowly defined categories, such as entertainment, clothing, or food. Accordingly, we asked, using a 5-point Likert scale, whether participants divide their monthly budget into several separate budgets (such as budgets for housing, clothes, leisure expenditures, study related expenditures, and the like).

The second question relates to the idea that narrow goals can help students to achieve self-control (as theoretically outlined by Koch and Nafziger 2016). We asked participants to consider the hypothetical situation where two weeks before an exam the professor hands out 30 practice exams. All questions for the actual exam would be drawn from these practice exams and it take 4 hours to work on a practice exam. Participants were then asked how and whether they would set goals for their exam preparation:

1. I set a daily study goal that specifies for each day between now and the exam date how many practice exams I want to work on.

2. I set a weekly study goal that specifies for each of the two weeks between now and the exam date how many practice exams I want to work on.

3. I set an overall goal that specifies how many practice exams I want to work on between now and the exam date.

4. I set no goal and just see how many practice exams I manage to work on between now and the exam date.

3.2.5 Strategic thinking

Subjects participated in a beauty contest game (e.g., Nagel 1995). In the beauty contest, subjects chose a number between 0 and 100, knowing that all the other participants in the same survey wave do the same. The average of all entered numbers was computed and multiplied by two thirds. The subject whose entry was closest to this number won the beauty contest and received 200 kr. All others received nothing. The Nash equilibrium of the beauty contest is that all players choose the number 0.

3.2.6 Cognitive reflection test

Participants completed the cognitive reflection test by Frederick (2005). In the cognitive reflection test, the impulsive answer to a simple math exercise is wrong. For example, the impulsive answer to the question "A bat and a ball cost 110 kr. in total. The bat costs 100 kr. more than the ball. How much does the ball cost?" is 10 kr., while the correct answer is 5 kr. There are 3 such questions in total. Participants received 2 kr. for each correct answer.

3.2.7 Psychological scales

We included the brief self-control scale (Tangney, Baumeister and Boone 2004). The scale consists of 13 statements, which relate to the perceived ability of an individual to exercise self-control, such as the ability to break habits, resist temptation and keep good self-discipline. It includes questions such as "I am good at resisting temptations" or "Pleasure and fun sometimes keep me from getting work done".
Further, we included the short grit scale (Duckworth, Peterson, Matthews and Kelly 2007). It consists of 8 questions such as "Setbacks don't discourage me" or "I finish whatever I begin".

3.2.8 Expectations

We asked about a range of questions about expectations and beliefs associated with future outcomes, such as future earnings with the respective degree a student was aiming for, expected study length for the respective degree, the relationship between obtained grades and income, and the likelihood that a student obtains a master's degree in the respective subject.

3.2.9 Background information related to education

We asked for some background information on the university qualifying exam, such as grades (Math, Danish, English and Physics), high school type, and date of the exam and, if relevant, the activity in the time between school and university (sabbatical year(s)). Further questions related to the (family) background of the student, such as the education of parents, the language spoken at home and financing of their studies.

3.2.10 Goals

We included several questions on goals, which can be divided into three main categories. The first category is about the type of goals students set for themselves, such as goals for course grades, or deadlines. The second category is about the goal setting process and potential mechanisms that help people stick to their goals. The last category asks about the subject's opinion about external, study-related commitment devices such as mandatory hand-in requirements or bets on study success.

3.3 Choice of major

The survey part included questions about how a student selected his/her study subject (interest, job opportunities, recommendations, fits talents, did not know), whether it was the most desired subject, whether the student was certain about his choice, and his/her motivation and satisfaction with the studies now enrolled in.

3.3.1 Other information

We included questions on height/weight (BMI), self-evaluated attractiveness and strength, as well as maximum liquidity within the next 3 days. The gender of a subject could be identified off the social security number collected to process payments.

3.4 Link to student registers

In the consent form, subjects were informed that their consent encompasses their consent to link the results from the survey with the student registers of Aarhus BSS and the Danish registers. In 2017, the survey data was linked through Statistics Denmark to the student registers at Aarhus BSS and parts of the Danish registers. The student registers contain around 500 variables – not all of them are high quality. In Appendix B, we provide an overview of the main variables.

References

Abdellaoui, Mohammed, Han Bleichrodt, and C Paraschiv, "Loss Aversion under Prospect Theory: A Parameter-Free Measurement," *Management Science*, January 2007.

Abeler, Johannes, Armin Falk, Lorenz Götte, and David Huffman, "Reference Points and Effort Provision," *American Economic Review*, 2011, *101* (2), 470–492.

Almlund, Mathilde, Angela Lee Duckworth, James J Heckman, and Tim D Kautz, "Personality psychology and economics," 2011.

Anderson, Jon, Stephen Burks, Colin DeYoung, and Aldo Rustichinid, "Toward the Integration of Personality Theory and Decision Theory in the Explanation of Economic Behavior," Technical Report 2011.

Augenblick, Ned, Muriel Niederle, and Charles Sprenger, "Working Over Time: Dynamic Inconsistency in Real Effort Tasks," *Quarterly Journal of Economics*, 2015, pp. 1067–1115.

Becker, Anke, Thomas Deckers, Thomas J Dohmen, Armin Falk, and Fabian Kosse, "The relationship between economic preferences and psychological personality measures," 2012.

Bernoulli, D, "Exposition of a New Theory on the Measurement of Risk," *Econometrica*, 1954, *22* (1), 23–36.

Borghans, Lex, Angela Lee Duckworth, James J. Heckman, and Bas ter Weel, "The Economics and Psychology of Personality Traits," *Journal of Human Resources*, 2008, *43* (4), 972–1059.

Burks, Stephen, Jeffrey Carpenter, Lorenz Goette, Kristen Monaco, Kay Porter, and Aldo Rustichini, "Using Behavioral Economic Field Experiments at a Firm: The Context and Design of the Truckers and Turnover Project," in Stefan Bender, Julia Lane, Kathryn L. Shaw, Fredrik Andersson, and Till von Wachter, eds., *The Analysis of*

Firms and Employees: Quantitative and Qualitative Approaches, University of Chicago Press, 2008, chapter 2, pp. 44–106.

Burks, Stephen V, Connor Lewis, Paul A Kivi, Amanda Wiener, Jon E Anderson, Lorenz Götte, Colin G DeYoung, and Aldo Rustichini, "Cognitive skills, personality, and economic preferences in collegiate success," *Journal of Economic Behavior & Organization*, 2015.

Dean, Mark and Pietro Ortoleva, "Is It All Connected? A Testing Ground for Unified Theories of Behavioral Economics Phenomena," mimeo, University of Columbia 2014.

Duckworth, A.L., C. Peterson, M.D. Matthews, and D.R. Kelly, "Grit: Perseverance and passion for long-term goals," *Journal of Personality and Social Psychology*, 2007, *92* (6), 1087–1101.

Duckworth, Angela L and Martin EP Seligman, "Self-discipline Outdoes IQ in Predicting Academic Performance of Adolescents," *Psychological Science*, 2005, *16* (12), 939–944.

Epper, Thomas, Alexander Koch, and Julia Nafziger, "Risk Preferences over Money and Effort," work in progress, Aarhus University 2018.

Fehr, E and L Goette, "Do Workers Work More if Wages are High? Evidence from a Randomized Field Experiment," *American Economic Review*, 2007, *97* (1), 298–317.

Frederick, Shane, "Cognitive Reflection and Decision Making," *Journal of Economic Perspectives*, 2005, pp. 25–42.

Gul, Faruk, "A Theory of Disappointment Aversion," *Econometrica*, January 1991, *59* (3), 667–686.

Heath, Chip and Jack B Soll, "Mental Budgeting and Consumer Decisions," *Journal of Consumer Research*, June 1996, *23* (1), 40–52.

Johnson, Eric, S Gaechter, and A Herrmann, "Exploring the Nature of Loss Aversion," *Institute for the Study of Labor (IZA), Bonn (Germany), Discussion Paper*, 2007, *2961*.

Kahneman, Daniel and Amos Tversky, "Prospect Theory: An Analysis of Decision under Risk," *Econometrica*, March 1979, *47* (2), 263–292.

___ and ___, "Choices, Values, and Frames," *American Psychologist*, 1984, *39* (4), 341–350.

Köbberling, V and Peter Wakker, "An Index of Loss Aversion," *Journal of Economic Theory*, January 2005, *112*, 119–131.

Koch, Alexander and Julia Nafziger, "Corrrelates of Narrow Bracketing," Working paper, Aarhus University 2018.

___ and ___, "Motivational Bracketing: An Experiment," Working paper, Aarhus University 2018.

Koch, Alexander K and Julia Nafziger, "Goals and Bracketing under Mental Accounting," *Journal of Economic Theory*, 2016, *162*, 305–351.

Koszegi, Botond and Matthew Rabin, "Reference-Dependent Risk Attitudes," *American Economic Review*, 2007, *97* (4), 1047–1073.

Laibson, David, "Golden Eggs and Hyperbolic Discounting," *Quarterly Journal of Economics*, May 1997, *112* (2), 443–477.

Nagel, Rosemarie, "Unraveling in guessing games: An experimental study," *The American Economic Review*, 1995, *85*, 1313–1326.

Niederle, Muriel and Lise Vesterlund, "Do Women Shy Away from Competition? Do Men Compete Too Much?," *Quarterly Journal of Economics*, 08 2007, *122* (3), 1067–1101.

Quiggin, John, "A Theory of Anticipated Utility," *Journal of Economic Behavior and Organization*, January 1982, *3*, 323–343.

Rabin, Matthew and Georg Weizsäcker, "Narrow Bracketing and Dominated Choices," *American Economic Review*, 2009, *99* (4), 1508–1543.

Reuben, Ernesto, Paola Sapienza, and Luigi Zingales, "A Description of the Templeton Chicago MBAs Longitudinal Study," mimeo, University of Chicago 2008.

Schmidt, Ulrich, Chris Starmer, and Robert Sugden, "Third-Generation Prospect Theory," *Journal of Risk and Uncertainty*, January 2005.

Sugden, Robert, "Reference-Dependent Subjective Expected Utility," *Journal of Economic Theory*, January 2003.

Sydnor, Justin, "(Over) Insuring Modest Risks," *American Economic Journal: Applied Economics*, 2010, *2* (4), 177–199.

Tangney, J. P., R. F. Baumeister, and A. L Boone, "High self-control predicts good adjustment, less pathology, better grades, and interpersonal success," *Journal of Personality*, 2004, *72*, 271–322.

Tversky, Amos and Daniel Kahneman, "The Framing of Decisions and the Psychology of Choice," *Science, New Series*, January 1981, *211* (4481), 453–458.

___ **and** ___ , "Advances in Prospect Theory: Cumulative Representation of Uncertainty," *Journal of Risk and Uncertainty*, January 1992, *5*, 297–323.

von Neumann, J and Oskar Morgenstern, "Theory of Games and Economic Behavior," *Princeton University Press, Princeton (NJ)*, 1947.

Yaari, Menahem, "The Dual Theory of Choice under Risk," *Econometrica*, January 1987, *55* (1), 95–115.

Appendix

A Characterization of Risk Preferences

We use the relative risk premium *in terms of terminal outcomes* as a nonparametric measure of risk aversion. For subject i and lottery j, we define

$$\text{rrp}_{ij}^{(\text{term.})} = \frac{\text{ev}_j - \text{ce}_{ij}}{|w_j + \text{ev}_j|}\,, \tag{2}$$

where ev denotes the (objective) expected value, ce denotes the (observed) certainty equivalent, and w denotes the lottery-specific endowment. $\text{rrp} > 0$ represents risk aversion, $\text{rrp} < 0$ represents risk seeking, and $\text{rrp} = 0$ represents risk neutrality.

Since, within all lottery configurations (see Tables 1-3), the terminal outcomes (x1Term and x2Term) are the same for the gain, the loss and the mixed lottery, *asset integration*[1] predicts that $\text{rrp}_{ij}^{(\text{term.})}$ is equal for the three lotteries j of subject i in a particular configuration.

Under *reference-dependence*[2], $\text{rrp}_{ij}^{(\text{term.})}$ may vary across the three lotteries of a particular configuration. *Diminishing sensitivity* (as motivated by Tversky and Kahneman (1992) and assumed by Koszegi and Rabin (2007)), i.e. a value function which is S-shaped around the reference point, predicts risk aversion ($\text{rrp}_{ij}^{(\text{term.})} > 0$) for gain lotteries and risk seeking ($\text{rrp}_{ij}^{(\text{term.})} < 0$) for loss lotteries. Further, *loss aversion* should produce more pronounced risk aversion near the reference point. An even stronger hypothesis than reference dependence, the *reflection effect* (see the discussion in Kahneman and Tversky (1979)), predicts a (perfect) negative correlation between risk aversion for gains and losses.

A.1 Estimation for the Representative Subject

The model for the representative subject pools all data and does not account for individual-level heterogeneity. Estimation of individual-level preference parameters follows the same procedure. Parameters are then also indexed by i. The following specification is used:

[1] A non-exhaustive list of theories assuming asset integration: expected utility theory (Bernoulli 1954, von Neumann and Morgenstern 1947), rank-dependent utility theory (Quiggin 1982, Yaari 1987), disappointment aversion theory (Gul 1991).

[2] Or *isolation*. Prospect theory (Kahneman and Tversky 1979, Tversky and Kahneman 1992, Schmidt, Starmer and Sugden 2005) and its derivatives (Koszegi and Rabin (2007), etc.), or Sugden (2003).

Model: We use the following prospect theory-type model (Tversky and Kahneman 1992) to characterize risk preferences:

$$v(\text{ce}) = p_1 v(x_1) + (1 - p_1) v(x_2)\,, \tag{3}$$

where ce is the *certainty equivalent*, and x_1, x_2 (with $x_1 > x_2$) are the outcomes (excluding the initial endowment), and p_1 is the probability that x_1 obtains. Since $p_1 = 0.5$ for all lotteries, we abstract from probability weighting and use objective probabilities instead. Further indices are omitted.

Value function : Motivated by Köbberling and Wakker (2005), we define the value function as follows

$$v(x) = \begin{cases} \frac{1-e^{-\mu x}}{\mu} & \text{if } x \geq 0 \\ (\lambda + 1)\left(\frac{e^{\nu x}-1}{\nu}\right) & \text{if } x < 0 \end{cases} \tag{4}$$

The value function is linear if $\mu = \nu = 0$, S-shaped if $\mu, \nu > 0$, inverted S-shaped if $\mu, \nu < 0$, and globally concave if $\mu \geq 0 \geq \nu$, c.p.. Note that we reparameterize λ, such that the output can be interpreted as a direct test of loss aversion: $\lambda > 0$ denotes loss aversion and $\lambda < 0$ what is sometimes coined "gain seeking" (Abdellaoui, Bleichrodt and Paraschiv 2007). Also, the outcomes were normalized for estimation, such that $[min(x_g), max(x_g)] \mapsto [0, 1]$ (for gains) and $[min(x_l), max(x_l)] \mapsto [-1, 0]$ (for losses). This rescaling only affects the two value function parameters μ and ν.[3]

Error specification: The predicted certainty equivalent $\hat{\text{ce}}_j$ for lottery j is

$$\hat{\text{ce}}_j = v^{(-1)}\left(0.5 v(x_{1j}) + 0.5 v(x_{2j})\right)\,, \tag{5}$$

where $v^{(-1)}$ denotes the inverse of the value function v. The observed certainty equivalent ce_{ij} may depart from the predicted certainty equivalent $\hat{\text{ce}}_j$ since subjects make errors when reporting their preference, or since our theoretical model does not represent the true data-generating process perfectly. Subject i reports $\text{ce}_{ij} = \hat{\text{ce}}_j + \varepsilon_{ij}$. We assume that $\varepsilon \sim_{i.i.d.}$

[3]Köbberling and Wakker (2005) also note that their scaling convention is "independent of the unit of payment" (p.121). The normalization solves the problem that most parameter estimates and standard errors are very close to zero, when not rescaled. Also, it improves convergence properties of the maximum likelihood procedure. An alternative method to solve these issues would be to increase the precision of the algorithm and present more digits in the results tables.

$\mathcal{N}(0, \sigma^2)$, where $\sigma = \tau(x_1 - x_2)$ is the error standard deviation, and $x_1 - x_2$ is a scaling accounting for lottery-specific heteroskedasticity.[4]

Likelihood function: Given the above assumptions, the density for the i-th subjects can be expressed as

$$f(\mathrm{ce}_{ij}, x_{1j}, x_{2j}; \mu, \nu, \lambda, \tau) = \prod_{j=1}^{J} \frac{1}{\sigma_j} \phi \left(\frac{\mathrm{ce}_{ij} - \hat{\mathrm{ce}}_j}{\sigma_j} \right) , \tag{6}$$

where $\phi(\cdot)$ denotes the density of the standard normal distribution. The log-likelihood of the model is given by

$$\ln \mathcal{L}(\mathrm{ce}_{ij}, x_{1j}, x_{2j}; \mu, \nu, \lambda, \tau) = \sum_{i=1}^{N} \left(\ln f(\cdot) \right) . \tag{7}$$

The parameters are estimated by maximizing $\ln \mathcal{L}$ with respect to the parameter vector $(\mu, \nu, \lambda, \tau)$ using a standard quasi-Newton method. Standard errors are derived form the observed Fisher information matrix.

A.2 Measures of Loss Aversion

All three lottery configurations feature a mixed lottery of the form $(x_1, 0.5; x_2)$ with $x_1 > x_2$ and $x_1 = \mathrm{abs}(x_2)$. The left-hand side column of the choice menus presents a series of (continuously ordered) certain alternatives $\mathrm{ce} \in [x_2, x_1]$. To get a feeling about how choices (i.e. switching points) map to the loss aversion parameter λ, we consider a set of parameter configurations of the above introduced model specification. This treatise will then motivate our measures of loss aversion.

To make general statements about the parameter bounds imposed on loss aversion λ, we normalize the lottery outcomes, such that $[x_2, x_1] \mapsto [-1, 1]$. Again, we follow the above introduced parameterization ($\lambda > 0$ means loss aversion, etc). Panel *a* of Figure 4 shows $\mathrm{ce} - \lambda$-correspondences under a piecewise linear value function (black line). Each horizontal gray line in the figure corresponds to an alternative in the choice menu. If the value function is indeed linear for the stakes under consideration, a subject should always reveal a switching point in the middle halve of the choice menu.[5] S-shaped value functions (Panel *b*), however,

[4] The step size between rows in each choice menu depends on the range of the lottery, and, hence, the error term has to vary with the resolution of the menu.

[5] This and the following arguments abstract from both, choice errors and probability distortion.

compress the mapping, rendering variations in ce less informative for λ than otherwise. Inverse S-shaped value functions, as depicted in Panel *c* have the opposite effect. The more concave the value function is in the loss domain, the more likely choices at lower ces get, etc. Note that, irrespective of the parameter configuration, it is rather hard to get narrow λ-bounds beyond $\lambda > 10$.

We now introduce three indices of loss aversion. The first one simply takes the switching point in the choice menu and monotonically transforms its value to derive a normalized measure. Some of the reporting errors are canceled out by aggregating over the three measures available. The second and the third measures explicitly model choice errors. The second is based on all nine lottery choices subjects made. Two parameters are estimated: The loss aversion parameter and an error variance. The value function is assumed to be piecewise linear. The third measure relaxes this assumption, and estimates for the full-fledged value function. This comes at a cost: Parameter estimates for subjects who repeatedly choose at the bounds of the choice menus or whose responses are too noisy are hard (or impossible) to obtain. Nevertheless, this exercise provides some test of robustness for the simpler measures of loss aversion.[6]

Here are the formal definitions of our loss aversion measures:

1. $\eta^{(\mathrm{sp})} = 1 - 2 \cdot \mathrm{sp}$: A (nonparametric) measure related to the one used by Fehr and Goette (2007) and Johnson, Gaechter and Herrmann (2007). This index takes the (relative) switching point sp as a measure of loss aversion, calculated by

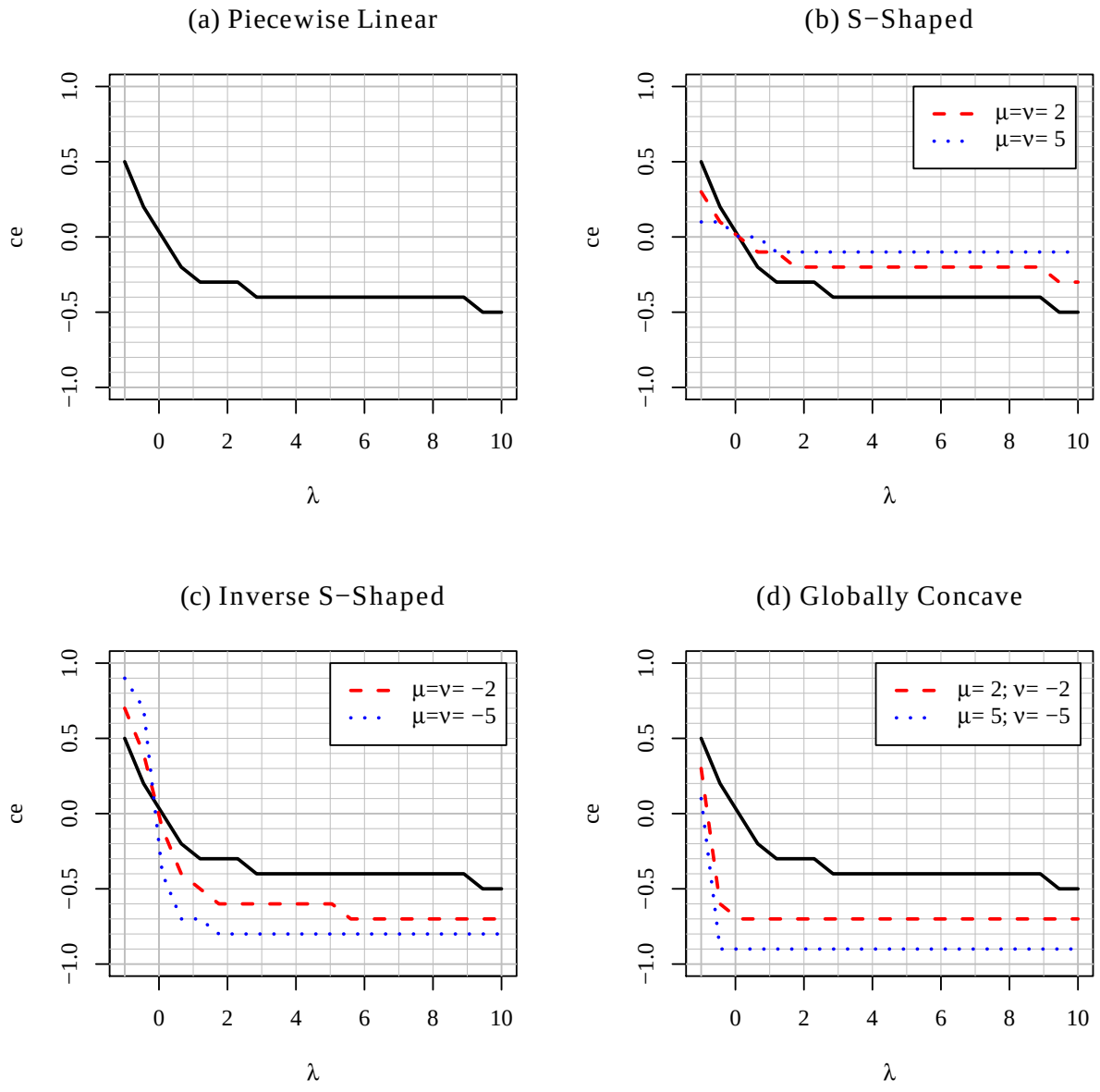
$$\mathrm{sp} = \frac{ce - x_2}{x_1 - x_2}\,. \tag{8}$$

   $\mathrm{sp} = 1$ means $ce = x_1$, $\mathrm{sp} = 0$ means $ce = x_2$.

   The measure is normalized, such that $\mathrm{sp} = 1$ indicates maximum loss (or risk) aversion, $\mathrm{sp} = -1$ indicates maximum gain seeking (or risk seeking), and $\mathrm{sp} = 0$ indicates neither

[6]It is possible to derive other indices of loss aversion from our data. Abdellaoui et al. (2007) provide an overview. Another alternative would be to (deterministically) calculate out the contribution nonlinear utility has.

Figure 4: Normalized Certainty Equivalents and Loss Aversion



nor. Measures can be generated using the choices in lottery (lotteryId) 2, 5 and 8, henceforth denoted by $\eta^{(\text{sp.2})}$, $\eta^{(\text{sp.5})}$ and $\eta^{(\text{sp.8})}$. We derive the more robust measure $\eta^{(\text{sp.mean})}$ by averaging over the three separate measures.

2. $\lambda^{(\text{pl})}$: An index of loss aversion estimated under the assumption that $\mu = \nu = 0$. We restrict λ to the interval $(-1, 10]$ For each subject, we further estimate the error variance.

3. $\lambda^{(\text{nl})}$: The same as $\lambda^{(\text{pl})}$, but this time allowing for $\mu, \nu \neq 0$, i.e. a nonlinear value function. We employ the same restriction as above, and also estimate the error variance.

B Most Important Variables in the Student Registers

- homrea: indicating where the student is a student, e.g. BSS
- institute: indicating which institute the student is enrolled at
- omraadeae: indicating which education the student is enrolled at
- admenhed: which area the student is enrolled under, like political science master or economy bachelor
- stu_kaldenavn: what the education is called
- stu_sted: where it student is enrolled geographically (Aarhus, Herning)
- studieretning: which education the student is taking (political sciene,)
- Specialisering: If the student is a masters student and have completed his masters thesis, which area the thesis was within
- Uddannelsestype: whether the exam was taken on the bachelor or masters level
- Start_dato: when the student startet the education
- Slut_data: when the student finished or expects to finish his education
- Slutstatus: indicating whether the student is still enrolled, have dropped out or ended his education

- Statustidspunkt: when the observation was "written"
- Periodevarighed: difference between start_dato and slut_dato in years
- aargang: which term the student started
- optagelsesaar: the year the student was admitted to the university
- aargangsaar: the year the student started attending the university
- studiestart: the month the student started attending the university
- ramme_aarsveark: the exact amount of time the student attended the university
- faktisk ects: how many points the student have completed at the time of observations
- semestre_paa_ae: number of semesters attended at Aarhus University
- gns_ects_paa_ae: Average number of ects per semester
- afrundet_gens_ects_ae: the above runded to number divisible by 5
- optimalects_paa_ae: the number of ects the student should have completed had she/he followed allocated time
- differenceects_ae: the difference between the optimal amount of ects and the actual
- kon: gender
- nationalitet: nationality
- dk_ud1: takes either value DK or foreign
- alder_ved_studiestart: age when the student started the study
- prio_nr: what number the education had in the prioritizing order
- sabbataar: number of years between high school and university
- adg_eksamen_kode: the code for which exam allowed the student to be admitted to university

- adg_eksamen: which high school the student attended before university
- aar: the year the exam allowing the student to attend university was obtained
- kvotient: the minimum grade needed to attend the university
- resultat: the high school gpa
- skolekode: the code for the high school
- skolenavn: name of high school
- studie_fradato: the date the student started the study (differs from startdato if the student switched to another education without leaving the university)
- studie_tildato: when the student ended the education
- indskrivningsmaade: how the student was admitted
- Status: whether the study is open, ended or interrupted
- Ae: the education
- Kode: indicates the same as "Ae"
- Langtnavn: name of course taken
- Bedoemmelsesdato: date of exam
- Per_forkortelse: the year and term (f or e) the exam was taken
- Eksamenstype: whether the exam was a reexam or not
- Month: the month the exam was taken
- Semester: the semester the student took the exam in
- Belastning: number of point allocated to the exam
- Belastningsenhed: which unit "belastning" is in.
- Status_studie: whether the course is open, ended or interrupted.

- Aggects: number of passed ects at the time of exam
- Passed: 1 if the student passed the exam.

C On-screen Instructions

Overview

The study was conducted online using the Qualtrics survey software. It could be taken either in Danish or English. We reproduce below the English version. Potential participants were invited in separate waves spread over September to October 2013.

Overview and order of elements in the online study

1. Introduction and consent
2. Competition [not relevant for the paper]
3. Time preferences task
4. Risk preferences
5. Beauty contest, survey questions, cognitive reflection test, concluding remarks [quite a few of the items are for other projects and not relevant in the context of this paper]

Introduction and Consent

Page 1

Introduction

Welcome to the scientific study on Aarhus University students' traits, behaviors and study outcomes conducted by Alexander Koch(Department of Economics and Business, Aarhus University). Thanks for your help with this study! The study is funded by the Aarhus University Research Foundation (AUFF) and the Danish Council for Independent Research | Social Sciences (FSE). The study is conducted online and consists of a **survey** and **several tasks**.

If you complete all parts you can earn in total up to 480 kr.

First part of study: You now start with the first part of the study, which runs this week. If you complete it you will for sure receive **50 kr. for your participation.** You will perform several tasks that allow you to earn more than these 50 kr. The exact amount depends on your and others' decisions and chance. **All in all you can earn up to 280 kr.** This part will take about **45-60 minutes**.

To be eligible for these payments you need to complete the entire first part.

Second part of study: By completing the first part you qualify for the second part of the study. This part requires making five decisions today and working on tasks in week 37 (9.-15.9.2013) and week 38 (16.-22.9.2013). In total, working on the tasks takes about **60 minutes** spread over 2 weeks. If you complete the second part, you receive **an additional 200kr**. We will ask you later whether or not you want to participate in the second part of the study.

Navigation:

- You do not need to do everything in one go. Your completed answers will be automatically saved and you can use your personalized link from the email to return as often as you like to complete the remaining parts before 23:59h on Sunday, 8.9.2013.
- Use the >> button to move to the next page. Note that once you pressed the >> button, in most cases you can't access that page anymore.
- You can choose the language (Danish or English) in the box at the upper right corner.
- Sometimes you might have to scroll down to reach the end of a page.
- Closing help boxes: you find the "close"-button at the bottom of the help-page. If you open a help box you might need to scroll up or down to find it.

Page 2

Eligibility for this study: To participate in this study you need to have a **Danish bank account** and will need to enter your **CPR number**, which will be transmitted by a secure internet connection. The CPR number is needed to pay you for participating in this study.
Payments: Aarhus University will automatically transfer the amount you earn into your NemKonto. This is simply your existing bank account, into which all payments from the public sector flow (e.g. tax refunds or SU student grants). Alexander Koch and his team will start registering the payments with the administration of Aarhus University in week 39 (23.-29.9.2013). Then the administrative process might take between 2-6 weeks. You can contact Alexander Koch by email (akoch@econ.au.dk) if you want information on the payment process. Please write this email address down, so that you have his contact details in case you later have any questions!
Taxes: According to Danish law, Aarhus University reports payments to the tax authorities. Please note that taxes might be deducted from the amount of money you earn. That is, the amount you will receive might be lower than the one stated.
Data protection: The data from this study will only be used for the purpose of scientific investigations. All the information will be analyzed and reported anonymously. CPR numbers are used to anonymously link the data with data from studies in which you may choose to participate in the future, student registers and public registers. The project is notified to the Danish Data Protection Agency (Datatilsynet) and the Ethics Commission (Videnskabsetisk Komité), and complies with their terms for protecting your privacy. By participating you agree that your data is used in the described way. Your participation in this study is voluntary and you are free to withdraw from it at any time.

Contact information: You can contact Alexander Koch (akoch@econ.au.dk) if you have further questions.

Page 3

I have read this information, accept the terms and conditions, and would like to participate in this study.

Yes No

Page 4

Please enter your CPR-Number (or your temporary CPR-number), which will be transmitted by a secure internet connection. Write it in without spaces or hyphen (e.g. 0112401234): We cannot pay you for your participation in the study without a correct and complete CPR-number!

Please confirm your CPR-Number:

Page 5

You start with several tasks that allow you to earn an additional amount of money beyond the 50 kr. paid for participating in this week's part of the study. The exact amount will depend on your and others' decisions and chance. After you performed these tasks, you move on to some survey questions. Remember that you need to complete the entire first part of the study this week to be eligible for the payments from the tasks and the 50 kr. for participation.

Instructions competition

Page 1

Your task is to count zeros in a series of tables. Such a table looks like follows and once you have counted the number of zeros in a table, you should enter the number of zeros in that table into a field below the table.

0	1	1	0	0
0	0	0	1	0
0	1	0	0	1
1	0	0	0	0
1	1	0	1	0
1	0	1	0	0

How many zeros are in the table?

(11 is the correct answer for this table)

On the next page you will have 3 minutes to count zeros in up to 40 tables. You earn 50 ører for each table where you counted the number of zeros correctly.

Once you finished a table, please scroll down to access the next table. Use the tab key to jump to the next data entry field, or select the field with a mouse click. The remaining time will be displayed on the right-hand side of the screen. After the 3 minutes have elapsed, all your entered answers will be saved and you will automatically be redirected to the next screen.

Do not use the back/forward/reload screen, etc. buttons on your browser toolbar. Do not close the browser. Doing so may invalidate results, in which case you will not receive payments for this task.

When you are ready to start, press the >> button.

Page 2

You have 3 minutes to count the number of zeros in up to 40 tables.

[Tables]

Page 3

Your answers have been registered. Continue now with the task.

Page 4

Round 2

You will again have 3 minutes to count the number of zeros in up to 40 tables. But now you can choose whether you want to be paid based just on your own performance or whether you want to compete with the performance of other participants in this study. Please select how you want to be paid for round 2:

- No competition: 50 ører per correctly counted table.
- Competition: 1 kr. per correctly counted table if you correctly count more tables than one randomly chosen participant did in round 1. If you count the same number, you get paid 1 kr. per correct table with probability 50 percent. If you count fewer tables correctly than the randomly chosen participant did in round 1, you earn nothing.

Page 5

Before you start counting for round 2, we ask you to rank your performance in round 1 relative to the performance of the other participants in round 1. Drag the slider to indicate your belief about your rank. For example, positioning the slider at 30, means that you think that 30 percent of all participants have fewer correct tables than you in round 1, and that 70 percent have more.

We add 5 kr. to your earnings if your answer hits your true rank plus / minus 5 percentage points. For example, suppose 30 percent of all participants had fewer correct tables in round 1 than you had in round 1. Then you get 5kr. if your slider was positioned somewhere between 25 and 35 percent.

What percent of participants had fewer correct tables than you in round 1?

[slider]

Page 6

When you are ready to start round 2 of counting zeros, move to the next page.

Do not use the back/forward/reload screen, etc. buttons on your browser toolbar. Do not close the browser. Doing so may invalidate results, in which case you will not receive payments for this task.

Page 7

You have 3 minutes to count the number of zeros in up to 40 tables.

[Tables]

Page 8

Your answers for this task have been registered. Please continue now with the next task. If you complete the entire first part, then you will receive an email when we initiate the payments to your bank account with feedback about the number of tables you correctly counted and a summary of your earnings from this task.

Instructions time preferences

In the survey experiment, before the risk task (Week 0)

Notes:

- If participants did not complete this part, they could do it again at the end of the survey

- The current weekday (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, or Sunday) and date (referred to below as t_0) is stored by the survey and used to display dates.

Page 1

Preparation for the second part of the study

Before continuing with the first part of the study, you now can decide whether to participate in the second part of the study. Here you can earn an additional 200 kr. If you participate, then you **make five decisions now; and on [weekday] of next week ([date for t_0+7 days]) as well as on [weekday] of the week after ([date for t_0+14 days]), you will have to count tables** – just like the ones you counted now. Counting will take approximately 60 minutes in total.

If you complete all these tasks you will receive 200kr. in addition to your other earnings from the first part of study. Please note: you need to complete the entire first part this week to be eligible for the second part of the study. You can opt out (at any time) of the second part without losing your earnings from the first part.

Would you like to participate?

- Yes, I want to participate in the first and second part of the study.
- No, I only want to participate in the first part of the study.[> continue with risk question]

Page 2

Today's five decisions for the second part: Schedule your work!

Next week on [weekday] ([date for t_0+7 days]) and in two weeks on [weekday] ([date for t_0+14 days]) you will have to count zeros in a number of tables – just like the ones you counted before. A table is only completed if you counted the number of zeros in it correctly. If you miscount a table, you will be asked to count it again.

In each week, you first have to complete 40 tables. In addition to these 40 tables, you have to complete a certain number of tables. You choose how many of these tables to complete in each week by making work schedules**. In a work schedule, you state how many tables you want to complete one week from today ([weekday, date for t_0+7 days]), and how many you want to complete two weeks from today ([weekday, date for t_0+14 days]).**

Page 3

Work schedules

You choose a work schedule from a list. Look at the example for such a list below. A work schedule states how many tables you want to complete next week and how many in two weeks. For example, the row “60 tables next week - 60 tables two weeks from now” means “I want to complete 60 tables on [weekday] of next week ([date for t_0+7 days]) and 60 tables on [weekday] in the week after ([date for t_0+14 days]).” From the 31 possible work schedules in the list, you select the work schedule that you like best.

In the example, every table you complete in next week reduces the number of tables you have to complete in two weeks by one. We refer to this as a **1:1** “**exchange rate”**. On the next screen we explain exchange rates further.

Work schedule example - exchange rate 1:1

[drop down list – see table below; one needs to choose away from default text "*Work schedule example - exchange rate 1:1****"]***

Page 4

Work schedules and exchange rates

There are 5 different exchange rates. For each of these exchange rates you choose a work schedule. That is, you make 5 work schedules. For example, the exchange rate may be 1:1.5, such that every table you complete next week reduces the number of tables you have to complete in two weeks by 1.5. Or, the exchange rate may be 1:0.5, such that every table you complete next week reduces the number of tables you have to complete in two weeks by 0.5.

One of the 5 work schedules may become the "work schedule that counts". If a work schedule is the "work schedule that counts", you have to complete the number of tables that you specified in this work schedule to be eligible for payments. Next week, we will inform you which work schedule is the "work schedule that counts" and give more details about the process.

You receive 200kr. if you complete all the tables as specified in the "work schedule that counts" and the additional 40 tables each week.

Page 5

Choose work schedules

Choose your work schedules for the 5 different exchange rates below. There are no right or wrong choices!

Remember:

- **Each work schedule could be chosen to be the "work schedule that counts". Thus, you should make each work schedule as if it were the "work schedule that counts".**
- **The tables in the work schedule are in addition to the 40 tables you have to complete each week.**

Help ***[see below for help text that appears when clicking here]***

[Decisions]

Work schedule 1: exchange rate 1:1.5 [dropdown list]

Work schedule 2: exchange rate 1:1.25 [dropdown list]

Work schedule 3: exchange rate 1:1 [dropdown list]

Work schedule 4: exchange rate 1:0.75 [dropdown list]

Work schedule 5: exchange rate 1:0.5 [dropdown list]

Help text (pop-up window):

Click on each of the dropdown lists to select the 5 work plans

For example, the exchange rate may be 1:1.5, such that every table you complete next week reduces the number of tables you have to complete two weeks from now by 1.5. Or, the exchange rate may be 1:0.5, such that every table you complete next week reduces the number of tables you have to complete two weeks from now by 0.5.

Dropdown menu items (next page)

Work schedule 1: exchange rate 1:1.5	**Work schedule 2: exchange rate 1:1.25**	**Work schedule 3: exchange rate 1:1**	**Work schedule 4: exchange rate 1:0.75**	**Work schedule 5: exchange rate 1:0.5**
Choose work schedule 1	Choose work schedule 2	Choose work schedule 3	Choose work schedule 4	Choose work schedule 5
120 tables next week - 0 tables two weeks from now	120 tables next week - 0 tables two weeks from now	120 tables next week - 0 tables two weeks from now	120 tables next week - 0 tables two weeks from now	120 tables next week - 0 tables two weeks from now
116 tables next week - 6 tables two weeks from now	116 tables next week - 5 tables two weeks from now	116 tables next week - 4 tables two weeks from now	116 tables next week - 3 tables two weeks from now	116 tables next week - 2 tables two weeks from now
112 tables next week - 12 tables two weeks from now	112 tables next week - 10 tables two weeks from now	112 tables next week - 8 tables two weeks from now	112 tables next week - 6 tables two weeks from now	112 tables next week - 4 tables two weeks from now
108 tables next week - 18 tables two weeks from now	108 tables next week - 15 tables two weeks from now	108 tables next week - 12 tables two weeks from now	108 tables next week - 9 tables two weeks from now	108 tables next week - 6 tables two weeks from now
104 tables next week - 24 tables two weeks from now	104 tables next week - 20 tables two weeks from now	104 tables next week - 16 tables two weeks from now	104 tables next week - 12 tables two weeks from now	104 tables next week - 8 tables two weeks from now
100 tables next week - 30 tables two weeks from now	100 tables next week - 25 tables two weeks from now	100 tables next week - 20 tables two weeks from now	100 tables next week - 15 tables two weeks from now	100 tables next week - 10 tables two weeks from now
96 tables next week - 36 tables two weeks from now	96 tables next week - 30 tables two weeks from now	96 tables next week - 24 tables two weeks from now	96 tables next week - 18 tables two weeks from now	96 tables next week - 12 tables two weeks from now
92 tables next week - 42 tables two weeks from now	92 tables next week - 35 tables two weeks from now	92 tables next week - 28 tables two weeks from now	92 tables next week - 21 tables two weeks from now	92 tables next week - 14 tables two weeks from now
88 tables next week - 48 tables two weeks from now	88 tables next week - 40 tables two weeks from now	88 tables next week - 32 tables two weeks from now	88 tables next week - 24 tables two weeks from now	88 tables next week - 16 tables two weeks from now
84 tables next week - 54 tables two weeks from now	84 tables next week - 45 tables two weeks from now	84 tables next week - 36 tables two weeks from now	84 tables next week - 27 tables two weeks from now	84 tables next week - 18 tables two weeks from now
80 tables next week - 60 tables two weeks from now	80 tables next week - 50 tables two weeks from now	80 tables next week - 40 tables two weeks from now	80 tables next week - 30 tables two weeks from now	80 tables next week - 20 tables two weeks from now
76 tables next week - 66 tables two weeks from now	76 tables next week - 55 tables two weeks from now	76 tables next week - 44 tables two weeks from now	76 tables next week - 33 tables two weeks from now	76 tables next week - 22 tables two weeks from now
72 tables next week - 72 tables two weeks from now	72 tables next week - 60 tables two weeks from now	72 tables next week - 48 tables two weeks from now	72 tables next week - 36 tables two weeks from now	72 tables next week - 24 tables two weeks from now
68 tables next week - 78 tables two weeks from now	68 tables next week - 65 tables two weeks from now	68 tables next week - 52 tables two weeks from now	68 tables next week - 39 tables two weeks from now	68 tables next week - 26 tables two weeks from now
64 tables next week - 84 tables two weeks from now	64 tables next week - 70 tables two weeks from now	64 tables next week - 56 tables two weeks from now	64 tables next week - 42 tables two weeks from now	64 tables next week - 28 tables two weeks from now
60 tables next week - 90 tables two weeks from now	60 tables next week - 75 tables two weeks from now	60 tables next week - 60 tables two weeks from now	60 tables next week - 45 tables two weeks from now	60 tables next week - 30 tables two weeks from now
56 tables next week - 96 tables two weeks from now	56 tables next week - 80 tables two weeks from now	56 tables next week - 64 tables two weeks from now	56 tables next week - 48 tables two weeks from now	56 tables next week - 32 tables two weeks from now
52 tables next week - 102 tables two weeks from now	52 tables next week - 85 tables two weeks from now	52 tables next week - 68 tables two weeks from now	52 tables next week - 51 tables two weeks from now	52 tables next week - 34 tables two weeks from now
48 tables next week - 108 tables two weeks from now	48 tables next week - 90 tables two weeks from now	48 tables next week - 72 tables two weeks from now	48 tables next week - 54 tables two weeks from now	48 tables next week - 36 tables two weeks from now
44 tables next week - 114 tables two weeks from now	44 tables next week - 95 tables two weeks from now	44 tables next week - 76 tables two weeks from now	44 tables next week - 57 tables two weeks from now	44 tables next week - 38 tables two weeks from now
40 tables next week - 120 tables two weeks from now	40 tables next week - 100 tables two weeks from now	40 tables next week - 80 tables two weeks from now	40 tables next week - 60 tables two weeks from now	40 tables next week - 40 tables two weeks from now
36 tables next week - 126 tables two weeks from now	36 tables next week - 105 tables two weeks from now	36 tables next week - 84 tables two weeks from now	36 tables next week - 63 tables two weeks from now	36 tables next week - 42 tables two weeks from now
32 tables next week - 132 tables two weeks from now	32 tables next week - 110 tables two weeks from now	32 tables next week - 88 tables two weeks from now	32 tables next week - 66 tables two weeks from now	32 tables next week - 44 tables two weeks from now
28 tables next week - 138 tables two weeks from now	28 tables next week - 115 tables two weeks from now	28 tables next week - 92 tables two weeks from now	28 tables next week - 69 tables two weeks from now	28 tables next week - 46 tables two weeks from now
24 tables next week - 144 tables two weeks from now	24 tables next week - 120 tables two weeks from now	24 tables next week - 96 tables two weeks from now	24 tables next week - 72 tables two weeks from now	24 tables next week - 48 tables two weeks from now
20 tables next week - 150 tables two weeks from now	20 tables next week - 125 tables two weeks from now	20 tables next week - 100 tables two weeks from now	20 tables next week - 75 tables two weeks from now	20 tables next week - 50 tables two weeks from now
16 tables next week - 156 tables two weeks from now	16 tables next week - 130 tables two weeks from now	16 tables next week - 104 tables two weeks from now	16 tables next week - 78 tables two weeks from now	16 tables next week - 52 tables two weeks from now
12 tables next week - 162 tables two weeks from now	12 tables next week - 135 tables two weeks from now	12 tables next week - 108 tables two weeks from now	12 tables next week - 81 tables two weeks from now	12 tables next week - 54 tables two weeks from now
8 tables next week - 168 tables two weeks from now	8 tables next week - 140 tables two weeks from now	8 tables next week - 112 tables two weeks from now	8 tables next week - 84 tables two weeks from now	8 tables next week - 56 tables two weeks from now
4 tables next week - 174 tables two weeks from now	4 tables next week - 145 tables two weeks from now	4 tables next week - 116 tables two weeks from now	4 tables next week - 87 tables two weeks from now	4 tables next week - 58 tables two weeks from now
0 tables next week - 180 tables two weeks from now	0 tables next week - 150 tables two weeks from now	0 tables next week - 120 tables two weeks from now	0 tables next week - 90 tables two weeks from now	0 tables next week - 60 tables two weeks from now

Page 6

Your work schedules have been registered. Remember that you need to complete the first part of the study this week to be eligible for the second part of the study. If you complete the entire first part, you will in 6 days, on [date for t_0+6 days] at 20:00h, receive an email with further instructions and a link allowing you to log in and complete the second part of the study.

Please continue now with the first part of the study.

One week after the survey experiment (Week 1)

Page 1

Complete 40 tables

Welcome to today's tasks. First, please count the number of zeros in the following 40 tables. If you miscount a table, you will be asked to count it again. Thereafter, we will give you information on the work schedules.

40 pages with tables like this one

Table 1/ 40

0	1	1	0	0
0	0	0	1	0
0	1	0	0	1
1	0	0	0	0
1	1	0	1	0
1	0	1	0	0

How many zeros are in the table?

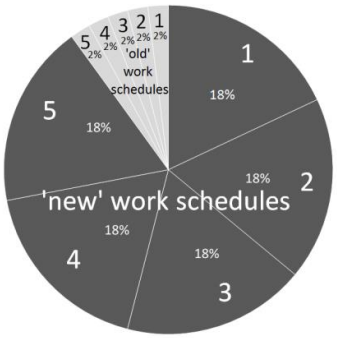
Page 42

Make 5 new work schedules

Remember that last week you made 5 work schedules for how many tables you wanted to complete this week and how many you wanted to complete one week from today. **You can now revise your work schedules and make 5 "new" work schedules**. A work schedule states how many tables you want to complete today and how many you want to complete one week from today (on [weekday], [date for t_0+14 days]).

The computer picks one work schedule to be the "work schedule that counts". Each of the "new" work schedules has an 18 percent chance of being picked as the "work schedule that counts". Each of the "old" work schedules has a 2 percent chance of being picked as the "work schedule that counts" (see figure).

That is, overall, **there is a 90 percent probability that one of the 5 "new" work schedules will be the "work schedule that counts", and there is a 10 percent probability that one of 5 the "old" work schedules from last week will be the "work schedule that counts"**. You will be informed about the "work schedule that counts" before you start counting tables. Remember: you have to complete the exact number of tables that is specified in the "work schedule that counts".



Page 43

Choose work schedules

Choose your work schedules for the 5 different exchange rates below. There are no right or wrong choices!

Remember:

- **Each work schedule could be chosen to be the "work schedule that counts". Thus, you should make each work schedule as if it was the "work schedule that counts".**
- **To complete the task and receive the 200 kr. you have to complete today's tables from the "work schedule that counts" by 23:59h on [weekday], [date for t_0+7 days], and you have to complete next week's tables on [weekday], [date for t_0+14 days], by 23:59h.**
- **The tables in the work schedule are in addition to the 40 tables you have to complete next week.**
- **Next week on at 20:00h you will receive an email with a link allowing you to log in to complete next week's tables.**

Help

[Decisions]

Work schedule 1: exchange rate 1:1.5 [dropdown list]

Work schedule 2: exchange rate 1:1.25 [dropdown list]

Work schedule 3: exchange rate 1:1 [dropdown list]

Work schedule 4: exchange rate 1:0.75 [dropdown list]

Work schedule 5: exchange rate 1:0.5 [dropdown list]

Help text and dropdown menu items (see week 0 instructions above)

Page 44

The following work schedule from this/last week ('new/old work schedule') has been chosen and thus is the "work schedule that counts":

[X] tables now and [Y] tables next week on [weekday], [date for t_0+14 days]

That is, **to complete the task and receive the 200 kr. you have to complete [X] tables by 23:59h on [weekday], [date for t_0+7 days] and you have to complete [Y] + 40 tables next week [weekday], [date for t_0+14 days].** Next week on [date for t_0+13 days] at 20:00h you will receive an email with a link allowing you to log in to complete next week's tables.

Page 45
Complete the tables from the binding work schedule

Now you have to **complete the [X] tables that were specified for this week in the "work schedule that counts".** If you miscount a table, you will be asked to count it again.

X pages with tables
[Tables from Work schedule]

Final page
You have now completed the tables for this week. Next week on [date for t_0+13 days] at 20:00h you will receive an email with a link allowing you to log in to complete next week's tables. Remember, **to complete the task and receive the 200 kr. you have to complete [Y] + 40 tables next week (on [weekday], [date for t_0+14 days]).**

Two weeks after the survey experiment (Week 2)

Page 1
Complete 40 tables

Welcome to today's tasks. First, please count the number of zeros in the following 40 tables. If you miscount a table, you will be asked to count it again. Thereafter, we will give you information on the work schedules.

40 pages with tables
[40 Tables]

Page 42
Complete the tables from the binding work schedule

Now you have to **complete the [Y] tables that were specified in the "work schedule that counts"**. If you miscount a table, you will be asked to count it again.

Remember, to complete the task and receive the 200 kr. you have to complete the tables **by 23:59h on [weekday], [date for t_0+14 days]**.

Y pages with tables
[Tables from Work schedule]

Final page
Thank you for participating. **You completed the second part of the study and you will thus receive 200 kr. in addition to your other earnings from the first part of the study.**

Alexander Koch and his team will start registering the payments with the administration of Aarhus University in week [week number]. Then the administrative process might take 2-6 weeks. You can contact Alexander Koch by email (akoch@econ.au.dk) if you want information on the payment process.

Instructions risk preferences

Page 1

Task 2

In this task, there are 9 questions. In each question you make choices between two alternatives - Alternative A and Alternative B. There are no right or wrong answers. Here is an example.

Alternative A: you get an amount of money for sure.

Alternative B: the amount of money you get is uncertain. That is, you win 0 kr. with probability 50 percent and you win 100 kr. with probability 50 percent.

Click image to enlarge

Each question gives you a list with different sure amounts of money. Each amount corresponds to a possible Alternative A. For each amount you decide whether you like Alternative A or Alternative B better.

To make your life easier, we implement a simple procedure such that you do not have to enter an answer for each amount. Look at the table below. **Consider the first row "Alternative A: win 0 kr. for sure":**

- You might prefer the 50 percent chance of winning 100kr. (Alternative B) over getting nothing for sure (Alternative A).

Now consider the row at the bottom "Alternative A: win 100 kr. for sure"

- Here you might prefer to win 100kr. for sure (Alternative A) over taking the risk of getting nothing in 50 percent of all cases (Alternative B).

And somewhere in between these two rows, there is a point where the sure Alternative A becomes more attractive to you than the risky Alternative B.

Click on the box for this Alternative A. Based on this answer the computer automatically fills in the rest of the table:

- The computer ticks Alternative A for the amount you selected and for all larger amounts.
- The computer ticks Alternative B for all smaller amounts.

After you clicked a box, you can change your choices by clicking on a different box.

Try this now! On the next screen we explain how you get paid.

Do you like Alternative A or Alternative B better?

(Remember: you only have to click on the first row where Alternative A becomes more attractive to you than the risky Alternative B)

	Alternative A You get the sure amount	Alternative B  Click image to enlarge
Alternative A: win **0kr.** for sure	○	○
Alternative A: win **5kr.** for sure	○	○
Alternative A: win **10kr.** for sure	○	○
Alternative A: win **15kr.** for sure	○	○
Alternative A: win **20kr.** for sure	○	○
Alternative A: win **25kr.** for sure	○	○
Alternative A: win **30kr.** for sure	○	○
Alternative A: win **35kr.** for sure	○	○
Alternative A: win **40kr.** for sure	○	○
Alternative A: win **45kr.** for sure	○	○
Alternative A: win **50kr.** for sure	○	○
Alternative A: win **55kr.** for sure	○	○
Alternative A: win **60kr.** for sure	○	○
Alternative A: win **65kr.** for sure	○	○
Alternative A: win **70kr.** for sure	○	○
Alternative A: win **75kr.** for sure	○	○
Alternative A: win **80kr.** for sure	○	○
Alternative A: win **85kr.** for sure	○	○
Alternative A: win **90kr.** for sure	○	○
Alternative A: win **95kr.** for sure	○	○
Alternative A: win **100kr.** for sure	○	○

Page 2

Here is how you will be paid.

After you have answered all 9 questions, the computer randomly selects one of the 9 questions as the **'question that is paid'**. Each question is equally likely to be selected.

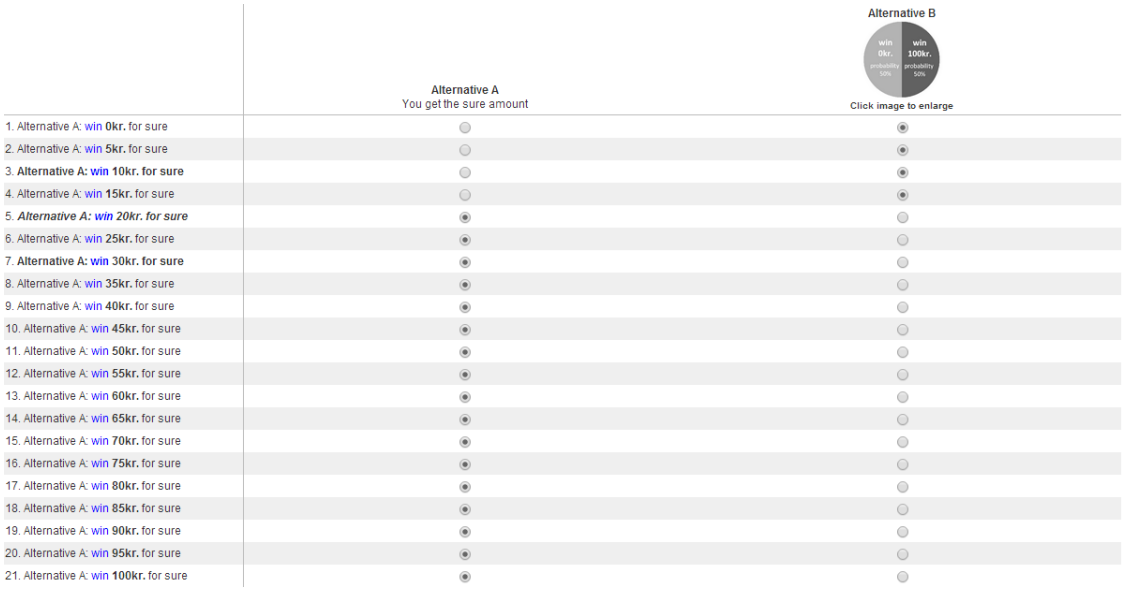
For the 'question that is paid' the computer randomly selects one of the rows from the list in that question as the **'row that counts'**. Each row is equally likely to be selected.

For the row that counts the computer checks whether you liked Alternative A or Alternative B better. If you liked Alternative A better, then you get the sure amount that is listed in that row. If you liked Alternative B better, then the computer randomly selects the outcome for this alternative.

Let's consider the example from the previous screen. Suppose 20 kr. is the sure amount where Alternative A becomes more attractive to you than the Alternative B (row 5).

- If, for example, row 7 was selected as the 'row that counts': For that row your choice is Alternative A. Hence, you would get paid according to Alternative A. That is, you win 30 kr.
- If, for example, row 3 was selected as the 'row that counts': For that row your choice is Alternative B. Hence, you would get paid according to Alternative B. That is, you win 0 kr. with 50 percent chance and win 100 kr. with 50 percent chance.

Start with the questions on the next screen.



	Alternative A You get the sure amount	Alternative B Click image to enlarge
1. Alternative A: win **0kr.** for sure	○	◉
2. Alternative A: win **5kr.** for sure	○	◉
3. **Alternative A: win 10kr. for sure**	○	◉
4. Alternative A: win **15kr.** for sure	○	◉
5. ***Alternative A: win 20kr. for sure***	◉	○
6. Alternative A: win **25kr.** for sure	◉	○
7. **Alternative A: win 30kr. for sure**	◉	○
8. Alternative A: win **35kr.** for sure	◉	○
9. Alternative A: win **40kr.** for sure	◉	○
10. Alternative A: win **45kr.** for sure	◉	○
11. Alternative A: win **50kr.** for sure	◉	○
12. Alternative A: win **55kr.** for sure	◉	○
13. Alternative A: win **60kr.** for sure	◉	○
14. Alternative A: win **65kr.** for sure	◉	○
15. Alternative A: win **70kr.** for sure	◉	○
16. Alternative A: win **75kr.** for sure	◉	○
17. Alternative A: win **80kr.** for sure	◉	○
18. Alternative A: win **85kr.** for sure	◉	○
19. Alternative A: win **90kr.** for sure	◉	○
20. Alternative A: win **95kr.** for sure	◉	○
21. Alternative A: win **100kr.** for sure	◉	○

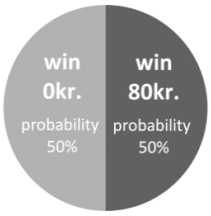
Pages 3-5

Question Block I: gain questions g40_120, g0_80, g0_160 (randomized order). They all have the same structure as below. Sure amounts are summarized in a table at the end for all risk questions.

Question nr. /9

Consider the following alternatives.

- Alternative A: you win an amount of money for sure.
- Alternative B: the amount of money you receive is uncertain. That is, you win 0 kr. with probability 50 percent and you win 80 kr. with probability 50 percent.



Click image to enlarge

Help

Do you like Alternative A or Alternative B better?
(Remember: you only have to click on the first row where Alternative A becomes more attractive to you than the risky Alternative B)

	Alternative A You win the sure amount	Alternative B  Click image to enlarge
Alternative A: win **0kr.** for sure	○	○
Alternative A: win **4kr.** for sure	○	○
Alternative A: win **8kr.** for sure	○	○
Alternative A: win **12kr.** for sure	○	○
Alternative A: win **16kr.** for sure	○	○
Alternative A: win **20kr.** for sure	○	○
Alternative A: win **24kr.** for sure	○	○
Alternative A: win **28kr.** for sure	○	○
Alternative A: win **32kr.** for sure	○	○
Alternative A: win **36kr.** for sure	○	○
Alternative A: win **40kr.** for sure	○	○
Alternative A: win **44kr.** for sure	○	○
Alternative A: win **48kr.** for sure	○	○
Alternative A: win **52kr.** for sure	○	○
Alternative A: win **56kr.** for sure	○	○
Alternative A: win **60kr.** for sure	○	○
Alternative A: win **64kr.** for sure	○	○
Alternative A: win **68kr.** for sure	○	○
Alternative A: win **72kr.** for sure	○	○
Alternative A: win **76kr.** for sure	○	○
Alternative A: win **80kr.** for sure	○	○

Help text (pop-up window)

You only have to click on the first row where Option A becomes more attractive to you than the risky Option B.

Based on this answer the computer automatically fills in the rest of the table:

- The computer ticks Alternative A for the amount you selected and for all larger amounts.
- The computer ticks Alternative B for all smaller amounts.

After you clicked a box, you can change your choices by clicking on a different box.

Reminder of how you get paid:

After you have answered all 9 questions, the computer randomly selects one of them as the **'question that is paid**'. Each question is equally likely to be selected.

For the 'question that is paid' the computer randomly selects one of the rows from the list in that question as the **'row that counts**'. Each row is equally likely to be selected.

For the row that counts the computer checks whether you liked Alternative A or Alternative B better. If you liked Alternative A better, then you get the sure amount that is listed in that row. If you liked Alternative B better, then the computer randomly selects the outcome for this alternative.

Page 6

Introduction to questions with possible losses

If one of the next 6 questions is selected for payment you will be given an extra amount on top of your other earnings. Each question has a different extra amount. You can see the exact extra amount when you answer the question.

You will be asked to make choices, which may involve losing money. If your choice involves losing money, these losses will be taken out of the extra amount you receive for the question.

Page 7

Question Block II: mixed gain-loss question m40_40 with endowment 40 or 80 (randomized; the version with the other endowment is then shown as question 9, i.e. in block IV).

Question nr. 4/9

If this question is selected for payment you will be given 40 kr. extra on top of your other earnings.

Consider the following alternatives.

- Alternative A: you lose or win an amount of money for sure.
- Alternative B: the amount of money you receive is uncertain. That is, you lose 40kr. with probability 50 percent and you gain 40kr. with probability 50 percent.

Click image to enlarge

Help

Do you like Alternative A or Alternative B better?
(Remember: you only have to click on the first row where Alternative A becomes more attractive to you than the risky Alternative B)

	Alternative A You lose/gain the sure amount	**Alternative B**  **Click image to enlarge**
Alternative A: lose **40kr.** for sure	○	○
Alternative A: lose **36kr.** for sure	○	○
Alternative A: lose **32kr.** for sure	○	○
Alternative A: lose **28kr.** for sure	○	○
Alternative A: lose **24kr.** for sure	○	○
Alternative A: lose **20kr.** for sure	○	○
Alternative A: lose **16kr.** for sure	○	○
Alternative A: lose **12kr.** for sure	○	○
Alternative A: lose **8kr.** for sure	○	○
Alternative A: lose **4kr.** for sure	○	○
Alternative A: lose **0kr.** for sure	○	○
Alternative A: win **4kr.** for sure	○	○

…

Help text (pop-up window)

You only have to click on the first row where Option A becomes more attractive to you than the risky Option B.

Based on this answer the computer automatically fills in the rest of the table:

- The computer ticks Alternative A for the amount you selected and for all larger amounts.
- The computer ticks Alternative B for all smaller amounts.

After you clicked a box, you can change your choices by clicking on a different box.

Reminder of how you get paid:

If this question is selected for payment you you will be given 40kr. extra on top of your other earnings. If your choice involves losing money, these losses will be taken out of these 40 kr.

After you have answered all 9 questions, the computer randomly selects one of them as the **'question that is paid**'. Each question is equally likely to be selected.

For the 'question that is paid' the computer randomly selects one of the rows from the list in that question as the **'row that counts**'. Each row is equally likely to be selected.

For the row that counts the computer checks whether you liked Alternative A or Alternative B better. If you liked Alternative A better, then you get the sure amount that is listed in that row. If you liked Alternative B better, then the computer randomly selects the outcome for this alternative.

Pages 8-10

Question Block III: mixed gain-loss question m80_80 with endowment 80 and loss questions l0_160 (endowment 160), l0_80 (endowment 80), l40_120 (endowment 160), (randomized). All questions have the same structure as the questions above. Sure amounts are summarized in a table at the end for all risk questions.

Pages 11

Question Block IV: mixed gain-loss question m40_40 with endowment 40 or 80 (the one not shown in block II).

Overview of certain amounts in the tables shown:

Row	g40_120	g0_80	g0_160	m40_40	m80_80	l0_160	l0_80	l40_120
1	40	0	0	-40	-80	-160	-80	-120
2	44	4	8	-36	-72	-152	-76	-116
3	48	8	16	-32	-64	-144	-72	-112
4	52	12	24	-28	-56	-136	-68	-108
5	56	16	32	-24	-48	-128	-64	-104
6	60	20	40	-20	-40	-120	-60	-100
7	64	24	48	-16	-32	-112	-56	-96
8	68	28	56	-12	-24	-104	-52	-92
9	72	32	64	-8	-16	-96	-48	-88
10	76	36	72	-4	-8	-88	-44	-84
11	80	40	80	0	0	-80	-40	-80
12	84	44	88	4	8	-72	-36	-76
13	88	48	96	8	16	-64	-32	-72
14	92	52	104	12	24	-56	-28	-68
15	96	56	112	16	32	-48	-24	-64
16	100	60	120	20	40	-40	-20	-60
17	104	64	128	24	48	-32	-16	-56
18	108	68	136	28	56	-24	-12	-52
19	112	72	144	32	64	-16	-8	-48
20	116	76	152	36	72	-8	-4	-44
21	120	80	160	40	80	0	0	-40

Note: certainty equivalents are calculated as the average between the first certain amount preferred over lottery (CE row) and the certain amount in the row before. Exceptions: the very first row (CE= lowest certain amount), or if always the lottery is preferred (CE=highest certain amount). See next table.

	sure amount	CE	sure amount	CE	sure amount	CE	sure amount	CE	sure amount	CE	sure amount	CE	sure amount	CE	sure amount	CE
Row	g40_120		g0_80		g0_160		m40_40		m80_80		l0_160		l0_80		l40_120	
1	40	40	0	0	0	0	-40	-40	-80	-80	-160	-160	-80	-80	-120	-120
2	44	42	4	2	8	4	-36	-38	-72	-76	-152	-156	-76	-78	-116	-118
3	48	46	8	6	16	12	-32	-34	-64	-68	-144	-148	-72	-74	-112	-114
4	52	50	12	10	24	20	-28	-30	-56	-60	-136	-140	-68	-70	-108	-110
5	56	54	16	14	32	28	-24	-26	-48	-52	-128	-132	-64	-66	-104	-106
6	60	58	20	18	40	36	-20	-22	-40	-44	-120	-124	-60	-62	-100	-102
7	64	62	24	22	48	44	-16	-18	-32	-36	-112	-116	-56	-58	-96	-98
8	68	66	28	26	56	52	-12	-14	-24	-28	-104	-108	-52	-54	-92	-94
9	72	70	32	30	64	60	-8	-10	-16	-20	-96	-100	-48	-50	-88	-90
10	76	74	36	34	72	68	-4	-6	-8	-12	-88	-92	-44	-46	-84	-86
11	80	78	40	38	80	76	0	-2	0	-4	-80	-84	-40	-42	-80	-82
12	84	82	44	42	88	84	4	2	8	4	-72	-76	-36	-38	-76	-78
13	88	86	48	46	96	92	8	6	16	12	-64	-68	-32	-34	-72	-74
14	92	90	52	50	104	100	12	10	24	20	-56	-60	-28	-30	-68	-70
15	96	94	56	54	112	108	16	14	32	28	-48	-52	-24	-26	-64	-66
16	100	98	60	58	120	116	20	18	40	36	-40	-44	-20	-22	-60	-62
17	104	102	64	62	128	124	24	22	48	44	-32	-36	-16	-18	-56	-58
18	108	106	68	66	136	132	28	26	56	52	-24	-28	-12	-14	-52	-54
19	112	110	72	70	144	140	32	30	64	60	-16	-20	-8	-10	-48	-50
20	116	114	76	74	152	148	36	34	72	68	-8	-12	-4	-6	-44	-46
21	120	118	80	78	160	156	40	38	80	76	0	-4	0	-2	-40	-42
22		120		80		160		40		80		0		0		-40

Survey questions, beauty contest and Cognitive Reflection Test

Beauty Contest

You have to write down a number between 0 and 100 (the number can have decimals). All the other participants of this survey do the same.

The average of all these numbers will be computed, and then this average is multiplied by two thirds. Call this number X. The winner is the participant who chose the number which is closest to X. If there are several participants who chose this number, the winner will be selected at random among them.

The winner will receive 200 kr. All other participants will receive 0 kr. for this task. You will be notified in week [Dates for PaymentWeek] whether you won.

Please enter your number here (enter decimals after a point):

Survey questions

We now would like to ask you several questions. Be honest – there are no right or wrong answers!

Remember: to be eligible for payments from the previous tasks and for the 50kr. you need to complete the entire survey.

Please read the following sentences and state how well they describe you. I decided to follow the study program I am currently enrolled in, because …

	Not like me at all	Not much like me	Somewhat like me	Mostly like me	Very much like me
I am very interested in the subject area, and I would like to know more about it:	❍	❍	❍	❍	❍
the study program fits my talents:	❍	❍	❍	❍	❍
I believe that as a graduate in this program I will have very good job opportunities and income prospects:	❍	❍	❍	❍	❍
I did not know what I should do otherwise:	❍	❍	❍	❍	❍
my family/friends recommended me to study this subject:	❍	❍	❍	❍	❍

Please read the following sentences and state how well they describe you.

	Not like me at all	Not much like me	Somewhat like me	Mostly like me	Very much like me
The study program I am enrolled in is my most desired study program:	❍	❍	❍	❍	❍
I was very certain about choosing my study program:	❍	❍	❍	❍	❍
I am very satisfied now with my chosen study program:	❍	❍	❍	❍	❍
I am very motivated for my studies:	❍	❍	❍	❍	❍
I am very certain that I will finish my studies at Aarhus University with a bachelor's or master's degree:	❍	❍	❍	❍	❍
I believe that my future income depends on my final average grade in my studies:	❍	❍	❍	❍	❍

How do you finance your studies? (you can name more than one option)

- ❑ My parents support me financially
- ❑ I get SU (Danish student grant and loan scheme)
- ❑ I have a job at the university
- ❑ I have a job outside of the university
- ❑ Other funding

What is the highest amount of money you could pay out of your own pocket within the next 3 days?

- ❍ less than 350 kr.
- ❍ 350 kr.
- ❍ 700 kr.
- ❍ 1500 kr.
- ❍ 2000 kr.
- ❍ 3500 kr.
- ❍ 7000 kr.
- ❍ more than 7000 kr.

Please state how well this sentence describes you: I divide my monthly budget into several separate budgets (such as budgets for housing, clothes, leisure expenditures, study related expenditures and the like).

- ❍ Not like me at all
- ❍ Not much like me
- ❍ Somewhat like me
- ❍ Mostly like me
- ❍ Very much like me

How many semesters do you think you will actually need to obtain the following degree:

_____ a bachelor's degree in your current studies:
_____ a master's degree in your current studies (exclusive semesters for bachelor's degree):

Suppose you will obtain a bachelor's degree in your subject. What do you think will be your monthly gross income in your first year of employment (in kr.)?

- ❍ Select from the list
- ❍ less than 15 000 kr.
- ❍ 15 000 - 20 000 kr.
- ❍ 20 000 - 25 000 kr.
- ❍ 25 000 - 30 000 kr.
- ❍ 30 000 - 35 000 kr.
- ❍ 35 000 - 40 000 kr.
- ❍ 40 000 - 45 000 kr.
- ❍ 45 000 - 50 000 kr.
- ❍ 50 000 - 55 000 kr.
- ❍ 55 000 - 60 000 kr.
- ❍ more than 60 000 kr.

Suppose you will obtain a master's degree in your subject. What do you think will be your monthly gross income in your first year of employment (in kr.)?

- ❍ Select from the list
- ❍ less than 15 000 kr.
- ❍ 15 000 - 20 000 kr.
- ❍ 20 000 - 25 000 kr.
- ❍ 25 000 - 30 000 kr.
- ❍ 30 000 - 35 000 kr.
- ❍ 35 000 - 40 000 kr.
- ❍ 40 000 - 45 000 kr.
- ❍ 45 000 - 50 000 kr.
- ❍ 50 000 - 55 000 kr.
- ❍ 55 000 - 60 000 kr.
- ❍ more than 60 000 kr.

Which university qualifying exam do you have?

- ❍ Studentereksamen (stx)
- ❍ Højere forberedelseseksamen (hf)
- ❍ Højere handelseksamen (hhx)
- ❍ Højere teknisk eksamen (htx)
- ❍ International high school degree
- ❍ Another university qualifying exam

Which grade did you obtain in your university qualifying exam in the following subjects (if you have several qualifying exams, write down the best grade at the highest level)?

	Grade (Danish 7-point-scale)								Subject level (Danish classification)			
	-3	00	02	4	7	10	12	Did not have subject	A	B	C	I do not know
Danish	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Mathematics	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
English	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Physics	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Which grade did you obtain in your university qualifying exam in the following subjects (if you have several qualifying exams, write down the best grade at the highest level)?

	Grade							Subject level (Danish classification)			
	A	B	C	D	E	F	Did not have subject	A	B	C	I do not know
Danish	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Mathematics	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
English	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Physics	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

When did you obtain your university qualifying exam?

- ❍ 2013
- ❍ 2012
- ❍ 2011
- ❍ 2010
- ❍ 2009
- ❍ 2008
- ❍ 2007
- ❍ 2006
- ❍ 2005
- ❍ before 2005

What did you do between your university qualifying exam and now? (You can give more than one answer)

- ❑ Travel
- ❑ Work
- ❑ Voluntary social work
- ❑ Højskole
- ❑ Second university qualifying exam
- ❑ Vocational training
- ❑ Completed university degree
- ❑ Started studying, but dropped out
- ❑ Other

What is the highest completed education of your parents?

Highest completed education of your mother

- ❍ 9-10 years of secondary school
- ❍ Higher secondary school (University entrance exam)
- ❍ Vocational education
- ❍ Short higher education, less than 3 years
- ❍ Long higher education, more than 3 years
- ❍ No completed education
- ❍ Other
- ❍ I do not know

Highest completed education of your father

- ❍ 9-10 years of secondary school
- ❍ Higher secondary school (University entrance exam)
- ❍ Vocational education
- ❍ Short higher education, less than 3 years
- ❍ Long higher education, more than 3 years
- ❍ No completed education
- ❍ Other
- ❍ I do not know

Which language do you speak at home with your parents?

- ❍ Danish
- ❍ Another language
- ❍ Danish and another language

Please read the following sentences and state how well they describe you.

	Not like me at all	Not much like me	Somewhat like me	Mostly like me	Very much like me
New ideas and projects sometimes distract me from previous ones:	❍	❍	❍	❍	❍
Setbacks don't discourage me:	❍	❍	❍	❍	❍
I have been obsessed with a certain idea or project for a short time but later lost interest:	❍	❍	❍	❍	❍
I am a hard worker:	❍	❍	❍	❍	❍
I often set a goal but later choose to pursue a different one:	❍	❍	❍	❍	❍
I have difficulty maintaining my focus on projects that take more than a few months to complete:	❍	❍	❍	❍	❍
I finish whatever I begin:	❍	❍	❍	❍	❍
I am diligent:	❍	❍	❍	❍	❍

Brief Self-Control Scale

Please read the following sentences and state how well they describe you.

	Not like me at all	Not much like me	Somewhat like me	Mostly like me	Very much like me
I am good at resisting temptation:	❍	❍	❍	❍	❍
I do certain things that are bad for me, if they are fun:	❍	❍	❍	❍	❍
I have a hard time breaking bad habits:	❍	❍	❍	❍	❍
I wish I had more self-discipline:	❍	❍	❍	❍	❍
I am lazy:	❍	❍	❍	❍	❍
I say inappropriate things:	❍	❍	❍	❍	❍
Pleasure and fun sometimes keep me from getting work done:	❍	❍	❍	❍	❍
I have trouble concentrating:	❍	❍	❍	❍	❍
I am able to work effectively toward long-term goals:	❍	❍	❍	❍	❍

Sometimes I can't stop myself from doing something, even if I know it is wrong:	❍	❍	❍	❍	❍
I often act without thinking through all the alternatives:	❍	❍	❍	❍	❍
People would say that I have iron self-discipline:	❍	❍	❍	❍	❍
I refuse things that are bad for me:	❍	❍	❍	❍	❍
I know that I often cannot resist temptations and thus try to avoid these temptations:	❍	❍	❍	❍	❍

Small-scale insurance

Have you ever have bought one of the following types of insurance:

	Yes	No
mobile phone theft/damage insurance:	❍	❍
bicycle insurance:	❍	❍
insurance of computer/laptop:	❍	❍
baggage insurance:	❍	❍
travel cancelation insurance:	❍	❍

Lost ticket - lost money questions (topical mental accounts)
[order randomized]

Imagine that you decided to see a play and that you paid the admission price of 200 kr. for the ticket. As you enter the theatre you notice that you have lost the ticket. Would you pay 200 kr. for another ticket?

- ❍ Very likely
- ❍ Likely
- ❍ Neither likely nor unlikely
- ❍ Unlikely
- ❍ Very unlikely

Imagine that you decided to see a play where the admission price is 200 kr. for a ticket. As you enter the theatre you notice that you have lost 200 kr. Would you still pay 200 kr. for a ticket for the play?

- ❍ Very likely
- ❍ Likely
- ❍ Neither likely nor unlikely
- ❍ Unlikely
- ❍ Very unlikely

Exam vignette (narrow goals)

Imagine that two weeks before an exam the professor hands out 30 practice exams. Furthermore, the professor tells you that all questions for the actual exam will be drawn from these practice exams. It takes you 4 hours to work through a practice exam. How would you plan your workload? Pick the one answer that describes you best:

- ❍ I set a daily study goal that specifies for each day between now and the exam date how many practice exams I want to work on.
- ❍ I set a weekly study goal that specifies for each of the two weeks between now and the exam date how many practice exams I want to work on.
- ❍ I set an overall goal that specifies how many practice exams I want to work on between now and the exam date.
- ❍ I set no goal and just see how many practice exams I manage to work on between now and the exam date.

Please read the following sentences and state how well they describe you. Related to my studies, I set...

	Not like me at all	Not much like me	Somewhat like me	Mostly like me	Very much like me
Goals for course grades:	❍	❍	❍	❍	❍
Goals for the number of study hours per day/week:	❍	❍	❍	❍	❍
Goals for regularly attending lectures and seminars:	❍	❍	❍	❍	❍
Goals for doing course work (e.g. problem sets):	❍	❍	❍	❍	❍
Goals for preparing work in study groups:	❍	❍	❍	❍	❍
Deadlines for when to complete different steps in project work:	❍	❍	❍	❍	❍

Please read the following sentences and state how well they describe you.

	Not like me at all	Not much like me	Somewhat like me	Mostly like me	Very much like me
I divide a goal into subgoals, to keep track of how I am doing:	❍	❍	❍	❍	❍
When setting a goal, I carefully think about what I want to achieve and when to achieve it:	❍	❍	❍	❍	❍
I sometimes do not set goals because I am afraid that I will not be able to achieve them:	❍	❍	❍	❍	❍
I feel angry with myself when I give up a goal:	❍	❍	❍	❍	❍
When I reach a goal I sometimes reward myself by buying something nice:	❍	❍	❍	❍	❍
I tell friends or family about my goals, to increase my motivation to achieve these goals:	❍	❍	❍	❍	❍
I set goals, but then often give them up:	❍	❍	❍	❍	❍
I set goals spontaneously:	❍	❍	❍	❍	❍
The goals I set for myself are very ambitious:	❍	❍	❍	❍	❍

Please read the following sentences and state to what extent you agree with the statement.

	Strongly disagree	Disagree	Neither/nor	Agree	Strongly agree
Mandatory course assignments are better than course assignments with a voluntary hand-in option:	❍	❍	❍	❍	❍
Project work should come with evenly spaced, strict deadlines rather than only being due at the end of term:	❍	❍	❍	❍	❍
If someone paid me money for good exam grades, I would study more:	❍	❍	❍	❍	❍
A study group motivates me to get more work done:	❍	❍	❍	❍	❍
To increase my motivation, I sometimes bet with friends or family for money, that I will reach a certain goal:	❍	❍	❍	❍	❍

What is your height in cm? (If you do not know your exact height, please make an estimate)

What is your weight in kg? (If you do not know your exact weight, please make an estimate)

How strong are you? Please rate your physical strength compared to the average of people of your age and gender:

- ❍ Much below the average
- ❍ Somewhat below the average
- ❍ Average
- ❍ Somewhat above the average
- ❍ Much above the average

How attractive are you? Please rate your physical attractiveness compared to the average of people of your age and gender:

- ❍ Much below the average
- ❍ Somewhat below the average
- ❍ Average
- ❍ Somewhat above the average
- ❍ Much above the average

ABCD question testing for viewing lotteries in isolation

For this question the computer will randomly select one participant as the 'participant who is paid'. If you are the 'participant who is paid':

- you will be given an extra 100 kr. on top of your other earnings. If your choice involves making losses, these losses will be taken out of these 100 kr.

-you will be paid for your Decision 1 and for your Decision 2 below.

You face the following pair of concurrent decisions. First examine both decisions, then indicate your choices, by ticking one of the two boxes in each decision.

Decision 1: Choose between (before answering, read Decision 2):

- ❍ winning 24 kr.
- ❍ a 25% chance of winning 100 kr. and a 75% chance of not winning or losing any money.

Decision 2: Choose between:

- ❍ losing 75 kr.
- ❍ a 75% chance of losing 100 kr., and a 25% chance of not winning or losing any money.

Cognitive reflection test

For the final 3 questions you earn 2kr. for each question that you answer correctly.

A bat and a ball cost 110kr. in total. The bat costs 100 kr. more than the ball. How much does the ball cost (in kr.)?

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets (in minutes)?

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake (in days)?

Concluding remarks

Thank you for participating in this study.

You now completed the first part of the study. In week [dates], you will receive an email which summarizes all your earnings and which gives you feedback on the tasks. Alexander Koch and his team will then also start registering the payments with the administration of Aarhus University. The administrative process might take up 2-6 weeks. You can contact Alexander Koch by email (akoch@econ.au.dk) if you want information on the payment process.

[*If time preference part skipped before:*
So far, you skipped the second part of the study, where you can earn an additional 200kr. Would you nevertheless like to participate in the second part of the study?

- ❍ Yes
- ❍ No]

[If participated in time preference part:
Next week [weekday, date], 20:00h you will receive an email with further instructions for the second part of the study, where you can earn an additional 200kr.]

Thank you for participating in this study.

Do you want to receive invitations to other studies in the Aarhus Cognition and Behavior Lab in which you can earn money?

- ❍ Yes
- ❍ No