

Written Exam at the Department of Economics winter 2016-17

**Behavioral Finance**

Final Exam

14-12-2016

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language for which you registered during exam registration.

**This exam question consists of 2 pages in total (including cover page)**

*NB: If you fall ill during the actual examination at Peter Bangsvej, you must contact an invigilator in order to be registered as having fallen ill. Then you submit a blank exam paper and leave the examination. When you arrive home, you must contact your GP and submit a medical report to the Faculty of Social Sciences no later than seven (7) days from the date of the exam.*

**Please answer all questions as concise and short as possible!**

**Good Luck!**

### **Question 1**

(1.a) Explain concisely miscalibration, why miscalibration represents a form of overconfidence and how it is measured. Also discuss the possible difficulties / confounds of the way in which miscalibration is measured. Describe an example highlighting how miscalibration influences financial/investment decisions.

**Points to be included:**

- Intuitively, miscalibration means that people believe that their knowledge is more precise than it actually is.
- That is, they are surprised more often than they (statistically) should.
- Miscalibration is often measured by asking people knowledge or forecasting questions in which they do not only have to specify their 'best guess' but also a confidence interval around the 'best guess' indicating how confident people are regarding their best guess.
- Often a 90 percent confidence interval is used which means that with unbiased beliefs the 'true answer' to the questions should lie within the confidence interval 90% of the times.
- Miscalibration / Overconfidence manifests itself by people specifying too tight confidence intervals.
- Points that should be included beyond the points raised above can be found in lecture 3 slides 7-10 as well as 16-21 and the associated mandatory reading.

### **Question 2**

(2.a) Briefly define the representativeness heuristic and give a short example highlighting how the representativeness heuristic influences judgements and financial decisions.

**Points to be included:**

- The points that should be included can be found in lecture 5 slide 8 as well as lecture 6 slides 21-26 and the associated mandatory reading.

(2.b) During one of the lectures and in the context of the assignment we talked about the gambler's and the hot-hand fallacy. We also went through examples based on the model by Rabin (2002), Inferences by Believers in the Law of Small Numbers, Quarterly Journal of Economics, 117(3), 775-816

Given this, please consider the following situation and answer the subsequent question:

An observer believes that there is an equal chance a fund manager can be any of three types, bad, average, or good, who outperforms other mutual funds 1/5, 2/5, or 3/5 of the time, respectively. What does he infer concerning the type of the fund manager from two bad years in a row, if he is a Bayesian and what does he infer, if he is a Rabin Type with N=4?

**Points to be included:**

**Note:** There has been a typo in the question. It should have said N=5, but it said N=4. This typo only affected the possibility to answer the second part of 2.b correctly. The answer regarding the Bayesian was unaffected. We have therefore decided to give points for the Rabin part of this question if the correct solution steps were taken independent of whether the numbers were correct or not.

Please find below the correct solution for the Bayesian and the Rabin type with N=5

- An observer believes a fund manager can be one of three types: good, average or bad
  - Bad firms outperform market 1/5 of times (-underperform 4/5 of the times),
  - Avg. firms outperform market 2/5 of times (underperform 3/5 of the times)
  - Good firms outperform market 3/5 of times (underperform 2/5 of the times)
- What does the investor conclude about the type of the fund manager if he observes 2 bad years in a row?

$$\begin{aligned} & \text{Prob}(\text{type} | 2 \text{ bad years}) \\ &= \frac{\text{Prob}(2 \text{ bad years} | \text{type}) \times \text{Prob}(\text{type})}{\text{Prob}(2 \text{ bad years})} \end{aligned}$$

- Let's first consider a Bayesian - Step 1:

$$\text{Prob}(2 \text{ bad years} | \text{good}) = 2/5 \times 2/5 = 0,16$$

$$\text{Prob}(2 \text{ bad years} | \text{average}) = 3/5 \times 3/5 = 0,36$$

$$\text{Prob}(2 \text{ bad years} | \text{bad}) = 4/5 \times 4/5 = 0.64$$

- Remember the observer believes that there is an equal chance the fund manager is one of the three types:

$$\text{Prob}(\text{prior}) = 1/3$$

and the total prior probability of seeing 2 bad years is:

$$\text{Prob}(2 \text{ bad years}) = 1/3[0.16 + 0.36 + 0.64]$$

- Bayesian – Step 2:

$$\text{Prob}(\text{bad} | 2 \text{ bad years}) = \frac{0.64 \times 1/3}{1/3[0.16 + 0.36 + 0.64]} = 0.55$$

$$\text{Prob}(\text{average} | 2 \text{ bad years}) = \frac{0.36 \times 1/3}{1/3[0.16 + 0.36 + 0.64]} = 0.31$$

$$\text{Prob}(\text{good} | 2 \text{ bad years}) = \frac{0.16 \times 1/3}{1/3[0.16 + 0.36 + 0.64]} = 0.13$$

- A Rabin-type with N=5 evaluates the situation differently - Step 1:

$$\text{Prob}(2 \text{ bad years} | \text{good}) = 2/5 \times 1/4 = 0.1$$

$$\text{Prob}(2 \text{ bad years} | \text{average}) = 3/5 \times 2/4 = 0.3$$

$$\text{Prob}(2 \text{ bad years} | \text{bad}) = 4/5 \times 3/4 = 0.6$$

- Rabin – Step 2:

$$\text{Prob}(\text{bad} | 2 \text{ bad years}) = \frac{0.6 \times 1/3}{1/3[0.6 + 0.3 + 0.1]} = 0.6$$

$$\text{Prob}(\text{average} | 2 \text{ bad years}) = \frac{0.3 \times 1/3}{1/3[0.6 + 0.3 + 0.1]} = 0.3$$

$$\text{Prob}(\text{good} | 2 \text{ bad years}) = \frac{0.1 \times 1/3}{1/3[0.6 + 0.3 + 0.1]} = 0.1$$

A Rabin-type overestimates the likelihood of a bad type (and underestimates likelihood of a good type) relative to the Bayesian.

### Question 3

(3.a) Please explain formally how economic theory has traditionally modelled decisions that have consequences (costs/benefits) at different points in time? In explaining the traditional model, please highlight the most fundamental consequence of this approach?

#### Points to be included:

- The discounted exponential utility model is the model traditionally used to describe decision situations involving trade-offs of costs and benefits that occur at different points in time.
- A fundamental consequence of the discounted exponential utility model used in traditional economic theory is that people behave time-consistent.
- Intuitively, time consistency refers to the fact that people should always stick to the plans they made earlier: Later preferences confirm earlier preferences.
- Points that should be included beyond the points raised above can be found in lecture 13 slides 1-15 as well as the associated mandatory reading.

(3.b) Why have economists started to criticize this traditional approach? Please formally explain the  $\beta$ - $\delta$ -model which has been suggested as a new, descriptively more accurate way to capture intertemporal decision making.

#### Points to be included:

- There is a lot of evidence that people are hyperbolic discounters rather than exponential discounters.
- Points that should be included in the answer to the first part of this question can be found in lecture 13 slides 17-25 as well as the associated mandatory reading.
- The  $\beta$ - $\delta$ -model is formally introduced in lecture 14 on slides 27-37 as well as the associated mandatory reading.

#### Question 4

(4.a) Explain the equity premium puzzle. Furthermore explain how myopic loss aversion can account for it.

#### Points to be included:

- Points to be included in this answer can be found the mandatory reading and lecture 9. The first part refers to points raised on slides 1-15 and the last part refers to points raised on slides 17-29.