UNIVERSITY OF WARWICK

Paper Details

Paper Code: IB9Y20

Paper Title: Behavioural Finance

Exam Period: April 2023

Exam Rubric

Time Allowed: 2 hours

Exam Type: Standard Examination

Approved Calculators: Permitted

Instructions

Answer **FOUR** questions in total. Each question is marked out of 100, and carries a weight of 25% of your total mark.

If you answer more than four questions, then only the first four questions you answer will count towards your mark.

For each question justify your answers as fully as possible.

Please make sure to write clearly.

Read carefully the instructions on the answer book and make sure the particulars required are entered on each answer book.

(Continued…/)

QUESTION 1

a. Describe how the bias of *representativeness* violates Bayesian Updating, and describe what kind of trade a rational arbitrager would make if all investors in the stock market exhibited representativeness when forming expectations.

[25 marks]

b. Discuss how behavioural finance provides an explanation for the predictability of abnormal returns after firms announce stock repurchases or equity offerings.

[25 marks]

c. Would the efficiency of the stock market be affected if investors formed expectations about future returns by extrapolating past returns? Discuss this issue, drawing on the evidence from relevant academic studies to support your arguments.

[50 marks]

[100 marks in total]

Continued…/

Question 2

a. Briefly explain the key differences between Expected Utility Theory and Prospect Theory.

[15 Marks]

b. Beatrix evaluates risky gambles according to Prospect theory, with the value function shown below:

$$v(x) = \begin{cases} x, & x \geq 0 \\ -2|x|, & x < 0 \end{cases}.$$

Beatrix faces only two investment opportunities: either investing her entire wealth (W=£100,000) in bonds at 7% risk-free return per year, or investing her entire wealth in the stock of a company Hatori. An investment in Hatori is risky: it could yield an annual return of 10% with probability 65%, -30% with probability 15% and 45% with probability 20%. Beatrix also engages in probability weighting, according to the function below (with δ=0.7):

$$\frac{p^{\delta}}{\left(p^{\delta}+(1-p)^{\delta}\right)^{1/\delta}}$$

Assuming that Beatrix's reference point is her current level of wealth, which is the best investment for her, the stock or the risk-free bond? Show all relevant calculations.

[25 Marks]

c. Beatrix joined an investment club, where she made a friend called Bill. Bill continuously boasts to Beatrix about the high returns he earned in a stock investment in the previous year. Without doing any calculations, discuss how meeting Bill could influence the way Beatrix evaluates risky gambles.

[10 Marks]

d. Describe the phenomenon known as the equity premium puzzle, and discuss whether prospect theory can provide an explanation for this puzzle, drawing on the relevant evidence from academic studies to support your arguments.

[50 marks]

[100 marks in total]

Continued…/

Question 3

a. Describe the Ellsberg Paradox, explain how it violates Subjective Expected Utility Theory, and briefly discuss whether, in your opinion, this paradox is relevant in financial markets.

[25 Marks]

b. Describe the limited stock market participation puzzle, and discuss how ambiguity aversion can provide an explanation for this puzzle, drawing on the findings by academic studies to support your arguments.

[25 Marks]

c. Assume a situation with one stock and three periods, $t = 0,1,2$. The stock will pay a liquidating dividend V at time $t = 2$. This dividend will depend on which state of the world prevails in period 2, which can be either "snow", "rain", "clouds" or "sunshine". The dividend will be 1 if it snows, 2 if it rains, 3 if there's clouds, and 4 if there's good old sunshine. In period $t = 1$, all market participants receive an identical information signal which says that there *will be no snow in* period 2 (i.e., that snow will not occur and that a state from the other three will occur).

i. Investors are identical and neutral, and their prior beliefs in period 0 (before receiving the signal) about future weather outcomes are represented by the following probabilities:

$$\Pr("snow") = 0.15,\ \Pr("rain") = 0.35,\ \Pr("sunshine") = 0.25,\ \Pr("clouds") = 0.25$$

Calculate the price of the asset at time 0 and at time 1, assuming investors use Bayes rule to update their beliefs after receiving the signal in period 1. Show all relevant calculations.

[15 marks]

ii. Investors are identical, risk neutral and *ambiguity averse*. They have non-additive beliefs about future weather outcomes, which are represented by the following capacities:

$$\nu("snow") = 0.15,\ \nu("rain") = 0.3,\ \nu("sunshine") = 0.2,\ \nu("clouds") = 0.2$$
$$\nu("snow","rain") = 0.4,\ \nu("snow","sunshine") = 0.25,\ \nu("snow","clouds") = 0.3,$$
$$\nu("rain","sunshine") = 0.45,\ \nu("rain","clouds") = 0.45,\ \nu("sunshine","clouds") = 0.35,$$
$$\nu(not\ \ "snow") = 0.65,\ \nu(not\ \ "rain") = 0.5,\ \nu(not\ \ "sunshine") = 0.6,$$
$$\nu(not\ \ "clouds") = 0.6.$$

Using the Choquet integral, calculate the price of the risky asset in this economy at time 0 and time 1. Assume investors use the Dempster-Shafer rule $\nu(A \mid B) = \dfrac{\nu(A \cup B^c) - \nu(B^c)}{1 - \nu(B^c)}$ to update their beliefs after receiving the signal in period 1. Show all relevant calculations.

[25 marks]

Question 3 continues on the next page…/

Question 3 continued…/

iii. Discuss whether the calculations in (i) and (ii) can provide an explanation for the equity premium puzzle.

[10 Marks]

Continued…./

Question 4.

a. Describe the notion of noise trader risk, and discuss how Shleifer and Vihny's (1997) theory explains that such risk can create limits to arbitrage in an economy that features delegated investments.

Shleifer, Andrei, and Robert W. Vishny. "The limits of arbitrage." *The Journal of finance* 52.1 (1997): 35-55.

[25 marks]

b. Discuss whether arbitrage can be destabilizing, drawing on the findings by academic studies to support your arguments.

[25 marks]

c. Using the theoretical framework in De Long, Shleifer, Summers and Waldmann (1990) discuss how the presence of noise traders influences equilibrium asset prices.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of political Economy*, *98*(4), 703-738.

[50 marks]

[100 marks in total]

Continued…/

Question 5

a. Discuss the mechanism through which sentiment can lead to the formation of asset pricing bubbles using the framework by Shiller, and briefly discuss whether the Bitcoin phenomenon can be explained by this theory.

[25 marks]

b. Can sentiment among investors lead to a break down in the relationship between risk and returns, as predicted by neoclassical asset pricing theories? Discuss this issue, drawing on the findings by academic studies to support your arguments.

[25 Marks]

c. Consider the following statement: "Events that are exogenous to financial markets do not affect asset prices". Discuss this statement, drawing on the findings by academic studies to support your arguments.

[25 Marks]

d. Sentiment cultivated ***endogenously*** by the economic system can affect asset prices, but measuring this sentiment can be difficult. Describe how different studies have measured *endogenous* sentiment, clearly explaining their methodology and results.

[25 marks]

[100 marks in total]

Continued…/

Question 6

a. Explain how the self-attribution bias can influence the way investors learn how skillful they are in stock selection, and discuss how this bias can provide an explanation for the findings in Barber and Odean (2002).

Barber, Brad M., and Terrance Odean. "Online investors: do the slow die first?." *The Review of financial studies* 15.2 (2002): 455-488.

[25 Marks]

b. "The stock trades of individual investors are based on good signals". Do you agree with this statement? Discuss, drawing on the evidence of academic studies to support your arguments.

Barber, Brad M., and Terrance Odean. "Trading is hazardous to your wealth: The common stock investment performance of individual investors." *The journal of Finance* 55.2 (2000): 773-806.

[25 Marks]

c. Mickey and Mallory are risk neutral investors who have the same expectations about the liquidating dividend *d* of a risky asset, depicted by a normal distribution with zero mean and variance σ^2 equal to 20,000. Mickey and Mallory conduct their own analysis, which has led them to generate their own signals, which we can write as $S_i = d + e_i$ where $e_i \sim N(0, \sigma_i^2)$ $i \in (Mickey, Mallory)$. Mickey's signal says that the liquidating dividend will be 200, and Mallory's signal says that the dividend will be 100. The forecast error *e* in both signals has zero mean and *true* variance of 16,000. Both Mickey and Mallory use Bayes Rule to update their expectations in light of the new information. However, Mickey is *overconfident*, and falsely believes that the variance of his signal is half from what it should be. Answer the following, showing all relevant calculations:

i. Compute Mickey's and Mallory's the posterior expectation of liquidating dividend, and explain how Mickey's overconfidence biases his expectations.

[20 Marks]

ii. Assuming that half of the investors in the market share Mickey's beliefs and half of the investors share Mallory's beliefs, calculate the asset's price. Assume that the stock is in zero-net supply, and that the demands for both types of the investors is of the form $D_\bullet = \delta(E^\bullet(d|s) - p)$, where $\bullet = Mallory, Mickey$ $\delta > 0$ and p is the current price. Is the asset over or under valued, and by how much?

[20 Marks]

iii. How much would the mispricing change if 70% of the investors in the market share Mickey's beliefs and 30% share Mallory's beliefs? Explain why your answer here different from what you calculated in part (ii).

[10 Marks]

[100 marks in total]

End of Paper