

CHAPTER 2: TOPICS IN CONSUMER THEORY

Exercise 1

The consumer buys bundle x^0 at prices p^0 and bundle x^1 at prices p^1 . State whether the following choices satisfy the Weak Axiom of Revealed Preferences (WARP): $p^0 = (1,3)$, $x^0 = (4,2)$, $p^1 = (3,5)$, $x^1 = (3,1)$.

Exercise 2

An expected utility maximizer with wealth w may invest B , $B < w$, in an asset that has a rate of return $a > 0$ with probability p and a rate of return $b < 0$ with probability $1 - p$ (i.e., investing B , with probability p he receives $(1 + a)B$; with probability $1-p$ he receives $(1 + b)B$). Show that if the expected rate of return is 0, the agent will invest $B = 0$ if he is risk averse.

Exercise 3

Filipe plays soccer with a second league team. If he does not suffer any injury by the end of the season, he will get a professional contract with his team, which is worth 10000 euros. If he is injured, he will get a contract as a fitness trainer, which is only worth 100 euros. The probability of suffering an injury is 10%. He is likely to get through the season unscathed with a 90% probability. Assume that Filipe's von Neuman-Morgenstern utility function is $u(x) = \sqrt{x}$.

- How high is the expected value of this gamble?
- Is Filipe risk averse, risk neutral, or risk lover?
- How high is the expected utility of the gamble described above?
- Assuming that Filipe could buy insurance at price p that would pay him 9900 euro in the case of an accident, how high could the maximal value of p be for Filipe to still afford the insurance?
- How high is the certainty equivalent for the above gamble? How high is the risk premium?

Exercise 4

A risk-averse individual with initial wealth w_0 and vNM utility function $u(\cdot)$ must decide whether and for how much to insure his car. The probability that he will have an accident and incur a dollar loss of L in damages is $\alpha \in (0, 1)$. Let p denote the rate at which each euro of insurance can be purchased (i.e., when x units of insurance are purchased, the agent pays px) and assume that insurance is available at an actuarially fair price (i.e., one that yields insurance companies zero expected profits). How much insurance, x , should he purchase?

Exercise 5

An agent is investing in the development of a new drug. His wealth will be W if the drug fails (probability p) and $W + A$ ($A > 0$) if the drug is successful (probability $1 - p$). The agent has the possibility of entering into a contract that for a price of pB will pay him B if the drug fails and will pay nothing if the drug is successful. The agent can choose the amount B . Show that a risk-averse, utility-maximising agent will choose $B = A$.

Exercise 6

Consider a risk-averse agent with a von Neumann-Morgenstern utility function $u(\cdot)$ and wealth w , who accepts taking the risk of suffering an injury with probability π and thus losing an amount D . The agent, however, has the possibility of paying qC as an insurance premium, where she would receive the amount C in case of an injury.

- a) The agent wishes to maximize her expected utility by choosing C . Formulate the optimization problem and calculate the first-order condition.
- b) Assume that the insurance is fair, i.e., $q = \pi$. To what extent would the agent insure herself in this case?