# Exam FIN 3005 Asset pricing – December 8, 2021

## 1. **Exercise 1**

Short and concise answers are rewarded - maximum one page.

a) What is the equity premium puzzle?

b) Why is it a puzzle?

c) Does the puzzle exist in Norway?

## 2. **Exercise 2**

An agent has power utility with constant relative risk aversion $\gamma = 2$. The agent's endowment (equals consumption if no trades take place) at time 0 is 10. The agent's time 1 consumption is 10 if no disaster happens. If a disaster takes place, the time 1 consumption is reduced to 5. The probability of disaster is $\frac{1}{10}$. For simplicity, assume that the risk free interest and the subjective discount rates are zero (i.e., $R^f = \beta = 1$ ).

The agent considers to buy full insurance. With full insurance the agent's time 1 consumption is 10 also if a disaster takes place.

a) Would the agent buy this insurance if the cost is 1 (measured in units of time 0 consumption)?

b) Calculate the expected loss (measured in units of time 1 consumption).

c) What is the maximum amount (in units of time 0 consumption) the agent would be willing to pay for this insurance?

## 3. **Exercise 3**

Consider a one period model with two time points, time 0 and time 1. Assume that three states are posible at time 1, called states 1, 2, and 3, respectively. Three securities, called $A$, $B$, and $C$, may be traded at time 0 for prices (in NOK) $A_0 = \frac{5}{9}$, $B_0 = \frac{1}{3}$, and $C_0 = \frac{14}{9}$, respectively. The securities have the following strictly positive time 1 payoffs: Security $A$ pays 1 NOK in state 1, and 1 NOK in state 3. Security $B$ pays 1 NOK in state 2, and 1 NOK in state 3. Security $C$ pays 2 NOK in state 1, and 1 NOK in state 2.

a) Calculate the state price for each of the three states. Recall that the state price of state $i$ is the time 0 price of a claim which pays 1 NOK in state $i$ and zero in all other states.

b) Calculate the (gross) risk free rate of return $R^f$.

c) Calculate the time 0 price $S_0$ of a stock $S$ with time 1 payoff $S(i) = i$ NOK in state $i$, for $i = 1, 2, 3$ ($S$ pays 1 NOK in state 1, 2 NOK in state 2, and 3 NOK in state 3).

d) Calculate the time 0 price of a European put option on stock $S$ with exercise price $K = 3$ and maturity at time 1. That is, calculate the time 0 price of a claim with state $i$ payoff (in NOK) equal to $\max[K - S(i), 0]$.

## 4. **Exercise 4**

Short and concise answers are rewarded - maximum one page.

In the article 'By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior' published in the *Journal of Political Economy.* in 1999, Campbell and Cochrane claim to have found a solution to the equity premium puzzle.

a) What is the intuition behind their main results and the new ideas of their model?

b) How do they model the primitives of their model, such as utility or the stochastic discount factor, relative to the standard model?

c) Does their model solve the corresponding risk free interest rate puzzle?