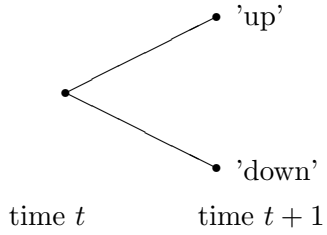
Exam FIN 3005 Asset pricing – May 11, 2022

Exercise 1.

In this exercise there are two dates, time t and time $t+1$, At time $t+1$, two (distinct) states are possible, the set-up can therefore be illustrated as:



Both states are equally likely (So the probabilitities for state *up* and *down* are $p_u = p_d = \frac{1}{2}$, respectively.). Sub or superscripts u and d are used to refer to quantities in state *up* and *down*, respectively. Subscript 0 is sometimes used to refer to time 0 quantitites.

Assume that the subjective discount rate is $\delta = -\ln(0.96)$, so that $\beta = e^{-\delta} = 0.96$. Notation is otherwise as used at the lectures (or in the textbook). The agent's utility for consumption at dates t and $t+1$ is given by the power utility function with risk aversion parameter $\gamma = 2$.

Assume that the agent's consumption is $C_0 = 20$, $C_u = 30$, and $C_d = 16\frac{2}{3}$.

a) Calculate the riskfree (gross) interest rate R^f. Calculate the net interest rate $r^f = R^f - 1$.

b) Calculate the time t price p_i, $i = A, B, C$, of the following three assets.

Asset A: $X_A^u = 10, X_A^d = 5$.
Asset B: $X_B^u = 5, X_B^d = 10$.
Asset C: $X_C^u = 10, X_C^d = 10$.

c) Calculate the present value, i.e. $\frac{E[X_i]}{R^F}$ of asset (i) A, B, and C.

d) Calculate the risk corrections $p_i - \frac{E[X_i]}{R^F}$ of asset (i) A, B, and C.

e) Calculate the risk corrections of asset i, $i = A, B, C$, by the formula

$$\frac{\text{cov}(\beta u'(C(t+1), X_i(t+1))}{u'(C(t))},$$

and compare the results with your results from the previous exercise.

f) Calculate the risk premium of asset A, B, and C.

g) Calculate the risk premium of asset A, B, and C by using the formula

$$-R^f \operatorname{cov}(m, R^i).$$

Compare the results with your results from the previous exercise.

Exercise 2.

The table below (Explanations and abbreviations in the table are written in Norwegian, but should be understandable by some straight forward googling.) shows estimated betas for a number of Norwegian companies based on data from 2002-2006. The table is from an article by Thore Johnsen and Ole Gjølberg.

Selskap	Markeds-vekt[1]	Stdav. a	Korrel. b	Just. stdav. c = a x b	**EK-beta** c / 20%
DnB Nor	6,0 %	24 %	0,65	16 %	0,80
Storebrand	1,0 %	42 %	0,69	29 %	1,46
FINANS	**7,0 %**	**33 %**	**0,67**	**23 %**	**1,13**
EIENDOM - Thon	**0,4 %**	**21 %**	**0,40**	**14 %**	**0,42**
Statoil	18,3 %	23 %	0,72	17 %	0,83
Hydro	12,7 %	28 %	0,84	24 %	1,20
Telenor	9,9 %	26 %	0,56	15 %	0,74
Orkla	3,7 %	23 %	0,70	16 %	0,82
Norske Skog	1,0 %	30 %	0,71	21 %	1,08
INDUSTRI	**45,6 %**	**26 %**	**0,71**	**19 %**	**0,93**
Royal Caribbean	2,8 %	39 %	0,50	19 %	0,98
Frontline	0,8 %	56 %	0,52	29 %	1,47
Stolt Nielsen	0,6 %	52 %	0,59	31 %	1,55
Wilh. Wilhelmsen	0,6 %	32 %	0,51	17 %	0,83
Odfjell	0,5 %	29 %	0,57	17 %	0,83
SHIPPING	**5,2 %**	**42 %**	**0,54**	**23 %**	**1,13**
PGS	1,3 %	104 %	0,44	45 %	2,29
Prosafe	1,0 %	29 %	0,71	21 %	1,05
Fred Olsen Energy	1,0 %	59 %	0,75	44 %	2,22
Subsea 7	0,9 %	50 %	0,49	25 %	1,40
Acergy	0,7 %	76 %	0,68	52 %	2,60
Bonheur	0,6 %	38 %	0,68	26 %	1,30
DOF	0,3 %	29 %	0,75	21 %	1,07
Farstad	0,3 %	28 %	0,72	20 %	1,00
Solstad	0,3 %	30 %	0,75	23 %	1,13
OIL SERVICES	**6,3 %**	**49 %**	**0,66**	**31 %**	**1,56**
SUM - uveiet	**64,5 %**	**40 %**	**0,63**	**25 %**	**1,23**
- verdiveiet		**30 %**	**0,68**	**20 %**	**1,01**
OSE	**1 980mrd**	**20 %**	**1,00**	**20 %**	**1,00**

[1] Andel av børsverdien pr 31.12.06

Select one company in the table (which also exist today). Check whether the beta of your selected company has changed if you base your estimations on daily data from the recent 3 months. Stock and market data may be found at `https://live.euronext.com/nb/markets/oslo`.

Exercise 3.

Consider an agent with initial wealth 10 and utility function of wealth

$$U(x) = \frac{1 - e^{-ax}}{a},$$

where $a = 2$ is a parameter. Assume a two period model and that the agent is exposed to a loss at time 1 of 5 with probability $\frac{1}{10}$. For simplicity, also assume that both the risk free and the subjective discount rates are zero.

a) Calculate the amount π the agent is willing to pay at time 0 for full insurance.

b) Is π proportional to the agent's level of wealth for this utility function?

Exercise 4.

Short and concise answers are rewarded - maximum one page.

a) What is the equity premium puzzle and why is it a puzzle?

In the article "Risks For the Long Run: A Potential Resolution of Asset Pricing Puzzles", Bansal and Yaran (2004) claim to have found a solution to the equity premium puzzle.

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

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