Universität Wien WS 2014
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Mathematical Finance 1
Exercise sheet 5

Please prepare the exercises of Sheet 3 and 4 which have not been treated in the exercise class last time.

1. Consider the following one-period models ($t \in \{0, 1\}$) for a financial market :
(A) $\Omega = \{\omega_1, \omega_2\}$, and

$$S_0^1 = 5, \quad S_1^1(\omega_1) = 6, \quad S^1(\omega_2) = 4.9\,.$$

(B) $\Omega = \{\omega_1, \omega_2, \omega_3\}$, and

$$S_0^1 = 5, \quad S_1^1(\omega_1) = 6, \quad S_1^1(\omega_2) = 4.9, \quad S_1^1(\omega_3) = 3.$$

(C) $\Omega = \{\omega_1, \omega_2, \omega_3\}$, and

$$\begin{pmatrix} S_0^1 \\ S_0^2 \end{pmatrix} = \begin{pmatrix} 5 \\ 10 \end{pmatrix}, \quad \begin{pmatrix} S_1^1(\omega_1) \\ S_1^2(\omega_1) \end{pmatrix} = \begin{pmatrix} 6 \\ 12 \end{pmatrix}, \quad \begin{pmatrix} S_1^1(\omega_2) \\ S_1^2(\omega_2) \end{pmatrix} = \begin{pmatrix} 6 \\ 8 \end{pmatrix}, \quad \begin{pmatrix} S_1^1(\omega_3) \\ S_1^2(\omega_3) \end{pmatrix} = \begin{pmatrix} 4 \\ 8 \end{pmatrix}.$$

In every model we assume that each ω_i has strict positive probability.

1) Which of the models satisfies (NA)? Describe for those models the set of equivalent martingale measures and for the others an arbitrage opportunity.

2) Which of the models satisfying (NA) is complete? Find for the non-complete models a claim which is not replicable.