Written Exam for M.Sc. in Economics

Investment Theory

3. January 2013

Master Course

3 hours written exam. Closed Books. All questions should be clearly and briefly answered. Calculations and figures should be clear and understandable. Calculations and figures should be explained.

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by "eksamen på dansk" in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students' self-service system.

Exercise 1.

Consider an investment project. The project can be started at cost $I > 0$. The dividend is P, where

$$dP = \alpha dt + \sigma dz$$

with $\sigma > 0$. The project can be exited at cost $E > 0$. The investment project can be started and stopped repeatedly.

The interest rate is $r > 0$. There is an asset with price $Q > 0$, where

$$dQ = \gamma Q dt + \tau Q dz$$

with $\tau > 0$. The asset pays no dividends.

Let $F(P)$ be the value of the option to invest and future investment possibilities. Let $V(P)$ be the value of an active project and future investment possibilities.

(a) Interpret the project. Give an example of an investment project that fits the above project.

(b) State a possible strategy for the project. Use the strategies to relate $F(P)$ and $V(P)$. Discuss the properties of $F(P)$ and $V(P)$.

(c) Explain how $F(P)$ can be found and derive a differential equation that $F(P)$ has to solve.

(d) Find $F(P)$ up to undetermined constants.

(e) Explain how $V(P)$ can be found and derive a differential equation that $V(P)$ has to solve.

(f) Find $V(P)$ up to undetermined constants.

(g) Interpret the expression for $V(P)$.

(h) Discuss how the optimal strategy for the project can be found.