Chapter 9: Real options analysis

Self test questions

1. If an investment project in real assets is valued as an option, the underlying value of the option is:

   (a) The investment outlay
   (b) The project's revenue
   (c) The project's net profit
   (d) The project's net present value (NPV)

2. If an investment project in real assets is valued as an option, the exercise price of the option is:

   (a) The investment outlay
   (b) The project's revenue
   (c) The project's net profit
   (d) The project's net present value (NPV)

3. Which of the following are sources of real option value?

   (a) Patents and copyrights ☐ True ☐ False
   (b) Mineral and development rights ☐ True ☐ False
   (c) The firm's technical know-how and market position ☐ True ☐ False
   (d) Market opportunities ☐ True ☐ False

4. When is a follow-up project not a real option?

   (a) When the original project is unprofitable
   (b) When the original project does not give any learning effects
   (c) When the input and output markets are very volatile
   (d) When the original project gives no advantage in input or output markets

5. Real options are more difficult to value than financial options because:

   (a) They rest on different assumptions ☐ True ☐ False
   (b) Their exercise price may not be clearly defined ☐ True ☐ False
   (c) Their maturity may not be clearly defined ☐ True ☐ False
   (d) Their underlying value may be difficult to calculate ☐ True ☐ False
   (d) The volatility of their underlying value may be difficult to calculate ☐ True ☐ False

6. Pricing real options with a replicating portfolio requires financial markets to be:
   (a) Complete ☐ True ☐ False
   (b) Perfect ☐ True ☐ False
   (c) Arbitrage free ☐ True ☐ False

7. Compared with financial options, real options valuation:
   (a) Makes stronger assumptions about the functioning of financial markets
   (b) Makes the same assumptions about the functioning of financial markets
   (c) Makes weaker assumptions about the functioning of financial markets

8. In the binomial model, the option to defer an investment project with one period is:
   (a) A European call option
   (b) A European put option
   (c) An American call option
   (d) An American put option

9. Real options can be valued with the *real probabilities* and:
   (a) The risk adjusted discount rate of the underlying project
   (b) The weighted average return of the replicating portfolio
   (c) The risk free interest rate
   (d) None of the above

10. Real options can be valued with the *risk neutral probabilities* and:
    (a) The risk adjusted discount rate of the underlying project
    (b) The weighted average return of the replicating portfolio
    (c) The risk free interest rate
    (d) None of the above

11. The option to repeat a project on a different scale after the original project is successfully concluded is:
    (a) A European call option
    (b) A European put option
    (c) An American call option
    (d) An American put option

12. The option to abandon a project at any point of its lifetime and sell its assets in the second hand market is:
    (a) A European call option
    (b) A European put option
    (c) An American call option
    (d) An American put option

13. If a project can be completed in a number of stages, each stage (except the last) can valued as:

    (a) A European call option on the next stage
    (b) A European put option on the next stage
    (c) An American call option on the next stage
    (d) An American put option on the next stage

14. If a project stage is valued as an option, the investments required for *later* stages:

    (a) Should be included in the investment required for this stage
    (b) Can be ignored, they only play a role in the later stages
    (c) Should be included as exercise prices of later options
    (d) None of the above

15. If a project stage is valued as an option, the investments made in *earlier* stages:

    (a) Should be included in the investment required for this stage
    (b) Can be ignored, they only play a role in the earlier stages
    (c) Should be included in the net value of the project so far
    (d) None of the above

16. In perfect markets, including the option to default a loan in the valuation of *a levered project* will:

    (a) Increase the total value of the project
    (b) Not change the total value of the project
    (c) Decrease the total value of the project

17. In perfect markets, including the option to default a loan in the valuation of *levered equity* (equity when debt is also used) will:

    (a) Increase the value of equity
    (b) Not change the value of equity
    (c) Decrease the value of equity

18. If a project is financed with limited liability equity and default risky debt, its equity is equivalent to:

    (a) A long call option on the project's assets
    (b) A long put option on the project's assets
    (c) The value of the project plus a long put option on the project's assets
    (d) None of the above

19. If a project is financed with limited liability equity and default risky debt, its debt is equivalent to:

    (a) A short call option on the project's assets
    (b) The value of the project plus a short call option on the project's assets
    (c) The value of the project plus a short put option on the project's assets
    (d) None of the above

20. If options to extend and to terminate are attached to the same project, the options interact because:

    (a) They both increase the value of the underlying project
    (b) The option to extend also extends the option to terminate
    (c) The option to terminate also terminates the option to extend
    (d) None of the above

21. If options to extend and to terminate are attached to the same project, their combined option value will be:

    (a) Higher than the sum of their stand-alone values
    (b) Equal to the sum of their stand-alone values
    (c) Lower than the sum of their stand-alone values

22. The interaction effect of two options is stronger if the options:

    (a) Are of the same type (both puts or both calls)
    (b) Are of the opposite type (one put and one call)
    (c) None of the above, does not depend on option type

23. A put and a call on the same underlying *cannot* interact:

    (a) If they have the same maturity ☐ True ☐ False
    (b) If they have the same exercise price ☐ True ☐ False
    (c) If they have both the same maturity and exercise price ☐ True ☐ False
    (d) If they have the same style (European or American) ☐ True ☐ False

24. When is it necessary to extend real options analysis with elements from game theory?

    (a) When the actions of competitors cannot be predicted
    (b) When competitors hold comparable proprietary options
    (c) When competitors hold shared options and the exercise decision depends on the exercise decisions of competitors

25. In game theory, a strategy is dominant if:

    (a) It gives the highest possible result
    (b) Its probability weighted expected result is highest
    (c) Its lowest result is higher than the lowest results of all other strategies
    (d) It gives better results than all other strategies for all actions of the competitors

26. In game theory, a Nash equilibrium occurs when

    (a) Demand equals supply
    (b) No investor wants to invest more at market prices
    (c) No investor wants to change his or her strategy if the strategies of the other investors become known
    (d) When there is no excess demand or supply