

# BSM906

# Economic Environment of Business

Lecture 1  
Strategic decision-making under uncertainty

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# Strategic decisions

- Should we start a new firm?  
(Should we invest in a new project, a new plant, etc?)
- Should we walk out of a project (i.e., close down a firm or a plant) if the returns are not up to our expectation (or, if we are making a loss)?
- When should we invest in a new project (or walk out of an existing one)?

# Strategic decisions about investment and exit

## Traditional view

- Look at the present discounted value of net cash flows
- If the present discounted value is negative, do not make the investment, and vice versa
- If there are several competing projects, choose those with higher present discounted values

$$NPV = -C + \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \dots + \frac{R_T}{(1+r)^T}$$

NPV = net present value

C = up front cost of investment

R = revenue in future periods ( $R_1$  in period 1,  $R_2$  in period 2, etc)

r = discount rate

# Strategic decisions on investment and exit

## Adding uncertainty

- Large company going through a cost cutting exercise
- Opportunity to invest in a new project involving a high-tech product
  - Immediate market prospects uncertain, but potential for a large number of spin-off products in the future
- Traditional approach will say that investment in the project should not be made: up-front cost ( $C$ ) is high, and future revenue ( $R$ ) are uncertain
- The strategic consideration that is ignored in this analysis is that the addition to the firm's growth capability in the future if the investment is made
  - The investment provides an option for growth in the future, and the value of this option has to be taken into account

# Strategic decisions and real options

Category	Description	Important in
Option to defer	Management holds a lease on (or option to buy) valuable land. It can wait ( $x$ years) to see if output prices justify constructing a plant or developing a field.	All natural resource extraction industries; real estate development, farming, etc.
Time to build option (staged investment)	Staging investment as a series of outlays creates the option to abandon enterprise in midstream, if new information is unfavourable. Each stage can be viewed as an option on the value of subsequent stages.	All R&D intensive industries, especially pharmaceuticals; long development capital-intensive projects; start-up ventures.
Option to abandon	If market conditions decline severely, management can abandon current operations and realise resale value of the assets in second-hand markets.	Capital intensive industries, such as airlines and railroads, financial services, new product introductions in uncertain markets.

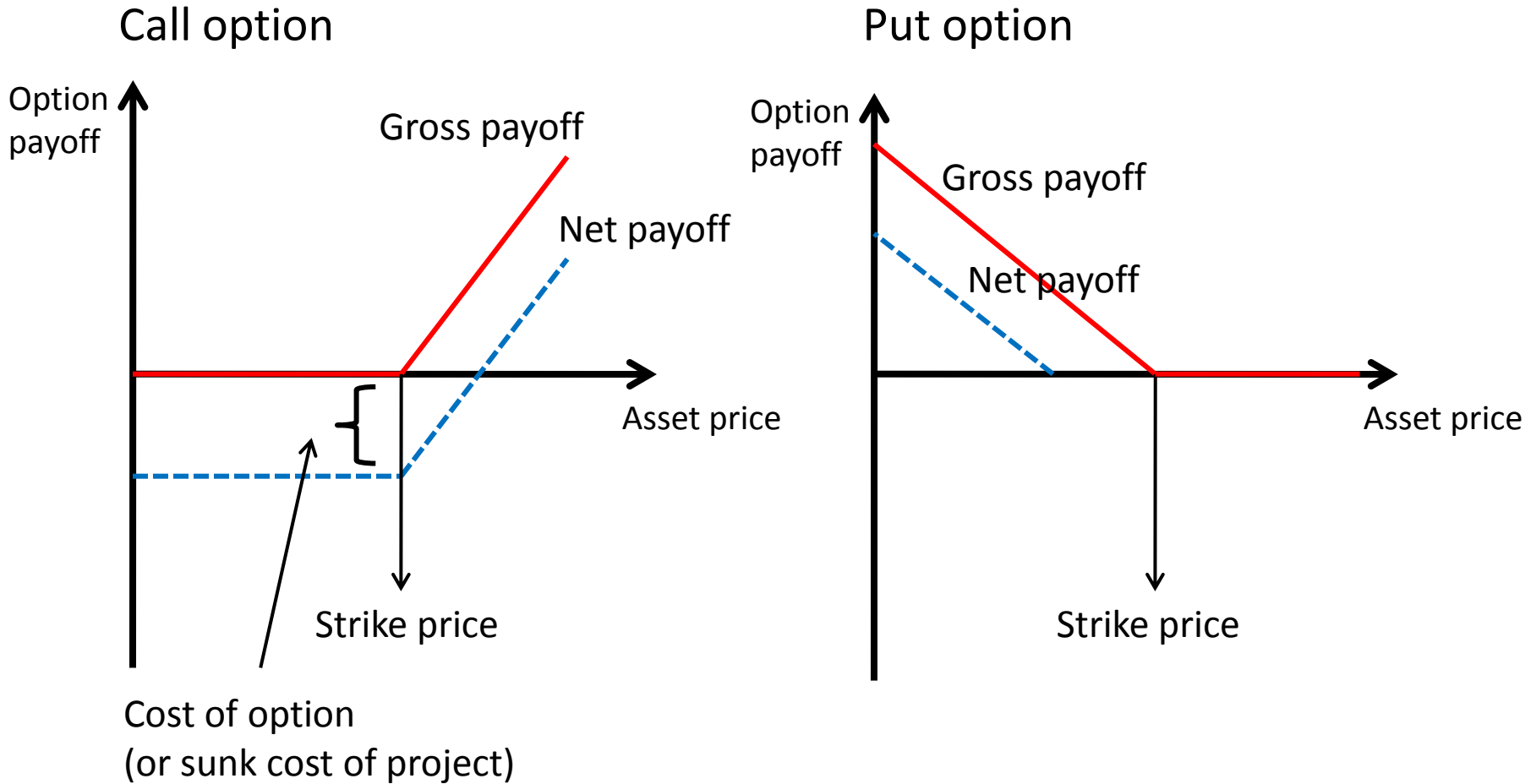
# Primer on option theory

## Call and put option

- Option
  - The *right* (but not the obligation) to buy or sell an asset at a predetermined price
  - Call: Right to *buy* the asset at a predetermined price
  - Put: Right to *sell* the asset at a predetermined price
- Strike price
  - The predetermined price at which the asset can be bought or sold
- Strike date
  - The date of exercise of the option
  - European: The option has to be exercised *on* the exercise date
  - American: The option has to be exercised *on or before* the exercise date

# Primer on option theory

## Payoff structure



# Primer on option theory

## Determinants of option value

- Uncertainty (or project risk)
  - Option value increases with the degree of uncertainty; the greater the uncertainty, the better is the ability to wait and yet retain the right to an action such as investment in a project
- The time to expiration
  - Option value increases with time to expiration
- The interest (or discount) rate
  - Option value decreases if there is an increase in the interest or discount rate, as future cash flows from exercising the option are discounted heavily
- Exclusivity
  - Option value is higher if the benefits from exercising the option accrues exclusively to the option's owner; it is lower if the benefits have to be shared with others

# Real options

## Strategic dimensions

- Who benefits from the exercise of the option?
  - Shared vs. proprietary
- Is there a direct benefit from holding the option, or does it pave the way for other opportunities in the future?
  - Simple vs. compound
- How urgently will I have to decide on whether to exercise the option?
  - Expiring vs. deferrable

# Real options

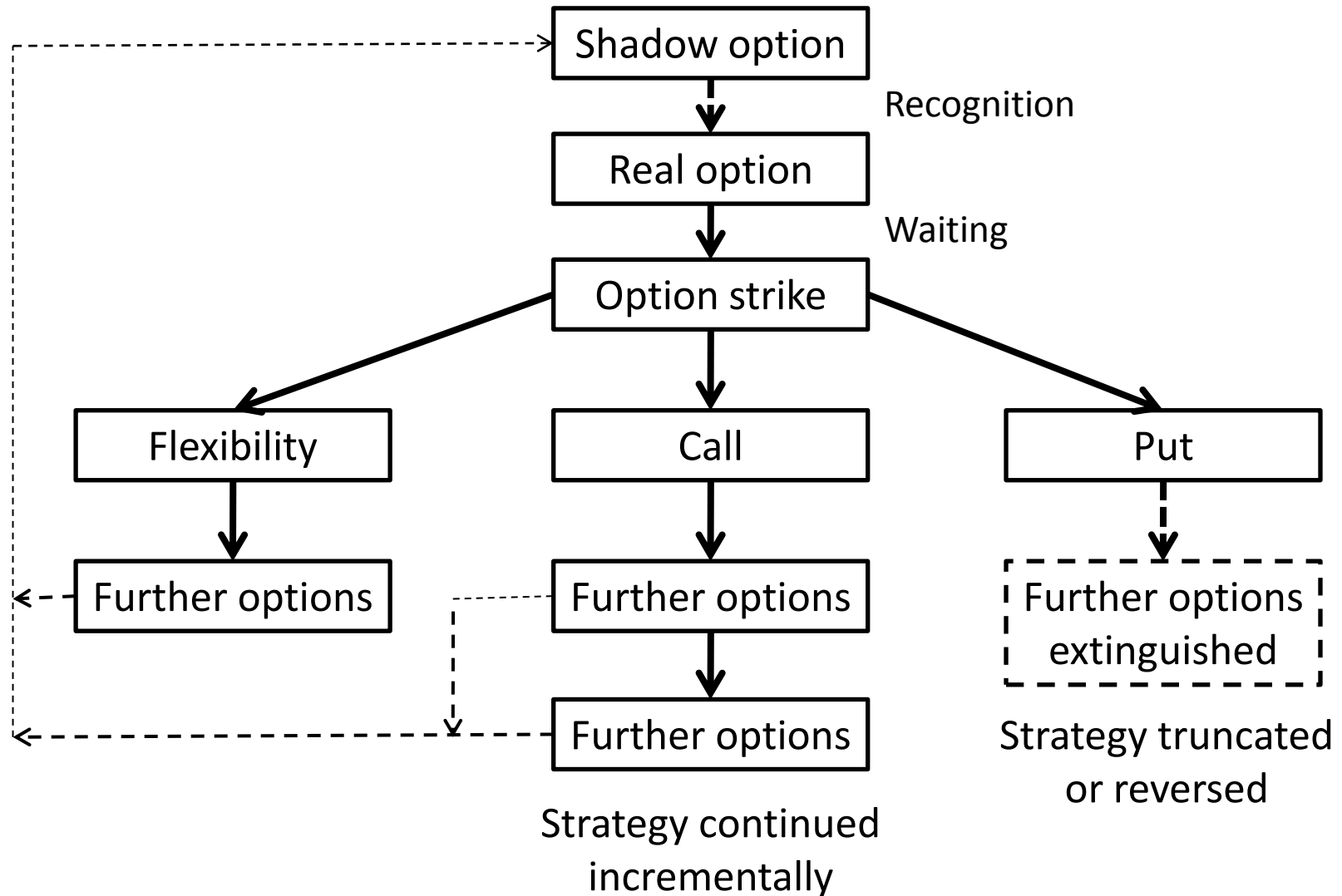
## Strategic dimensions – examples

Proprietary	Simple	Expiring	Routine maintenance
		Deferrable	Plant modernisation
	Compound	Expiring	Immediate franchise offer
		Deferrable	R&D of a unique product
Shared	Simple	Expiring	Bidding for purchase of a firm's assets
		Deferrable	New product introduction (with close substitutes)
	Compound	Expiring	Bidding for acquisition of an unrelated company
		Deferrable	Opportunity to enter a new geographic market

# Strategy as an option chain – basics

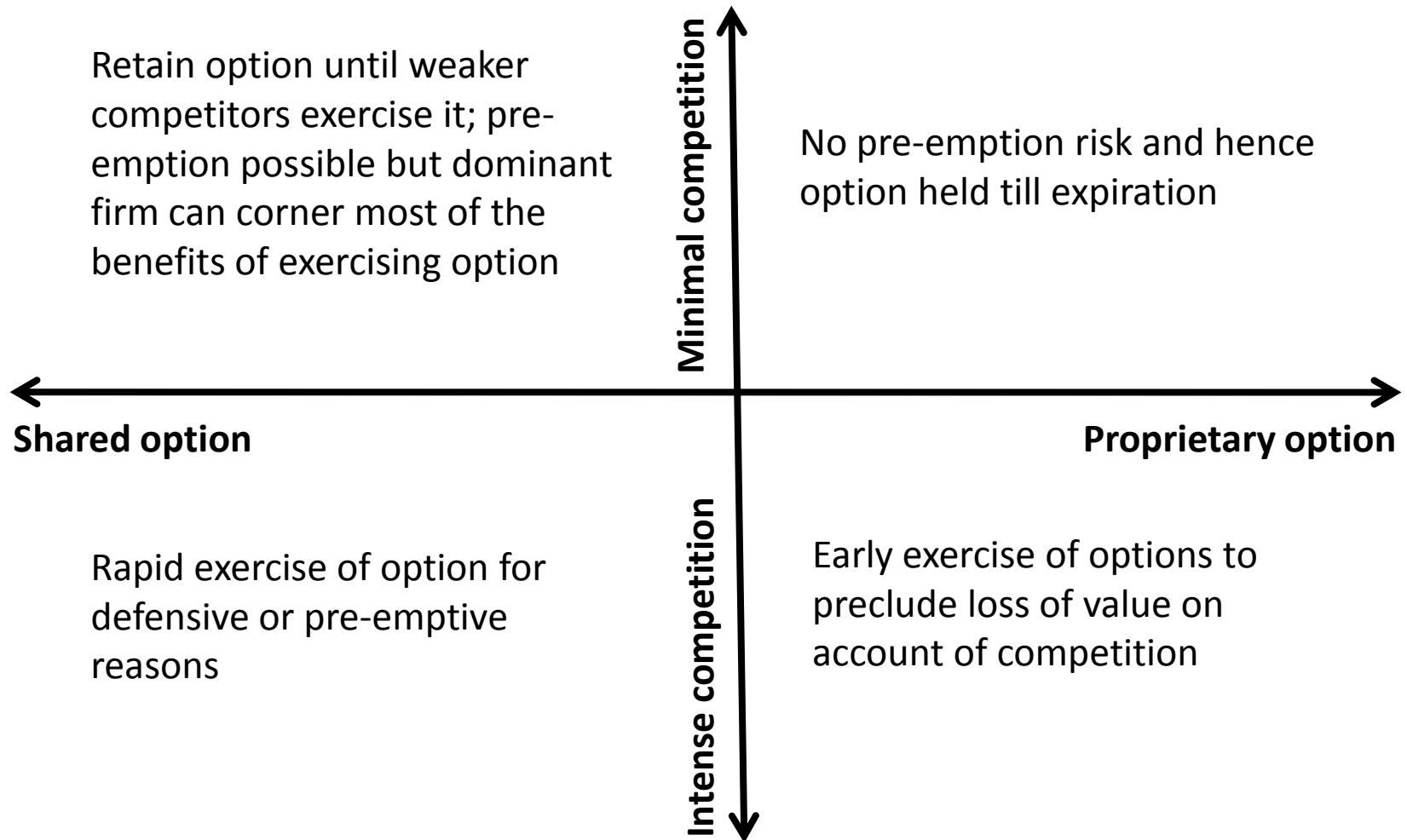
- Strategies are produced by sequentially entering into, exercising, abandoning or selling options
- Options can be *incremental* options or *flexibility* options
  - Incremental options are simple *calls* or *puts*
  - Call options that define strategies can be reversed or sold (e.g., selling a JV share to the JV partner)
  - Flexibility options facilitate strategic change (e.g., producing oil and gas while investing in green technology)
- The process starts with a firm's management recognising the potential to gain in the future by gaining access to an asset or developing a technology (shadow option) and then making a small investment to secure preferential access to the asset or taking a step towards development of the capability

# Strategy as an option chain – visualisation



# Real options

## Strategic dimensions: application – I



# Real options

## Strategic dimensions: application – II

- When would a firm enter a market?
- Neoclassical economics
  - As soon as the profitability of incumbent firms in an industry increases, the marginal benefit of entering the market will increase for the potential firm, exceeding its cost of capital; the firm should therefore enter
  - If there is no entry, it is on account of strategy adopted by the incumbent firm(s) to keep out potential competitors
- Real options approach
  - Given any level of profitability of incumbent firms, there is value in waiting for further information about demand etc before making an irreversible investment
  - Hence the profitability of the incumbent firms will have to be much higher than the cost of capital before the potential entrant exercises the option to enter and thereby exhausts the option value of waiting

# Real options

## Impact of organisational forms

- Firm divided into divisions, each of which produces an output (M-form)
  - The corporate office manages the options associated with all the divisions
  - If each division represents an option, the corporate office in effect manages a portfolio of options
  - The management of these options is done by way of acquisitions (of new options) and divestitures (or sale of options)
- Keiretsu
  - Functionally independent firms, generally from the same business group, organised around a main bank
  - The firms have functional independence, and hence each manages (i.e., buys, exercises and sells) its own options
  - Offers a more effective way to manage options than the M-form structure

# The human being behind the strategies

## Expected utility theory

	Probabilities	Payoff from Strategy 1	Payoff from Strategy 2	Payoff from Strategy 3
Outcome A	0.3	20	10	40
Outcome B	0.2	20	40	20
Outcome C	0.5	30	10	10
Expected payoff		<b>25</b> = (0.3 x 20) + (0.2 x 20) + (0.5 x 30)	<b>16</b> = (0.3 x 10) + (0.2 x 40) + (0.5 x 10)	<b>21</b> = (0.3 x 40) + (0.2 x 20) + (0.5 x 10)

Expected utility theory suggests that an individual would choose Strategy 1.

# The human being behind the strategies

## Prospect theory

- People think about outcomes of their choices in terms of profits and losses, i.e., in terms of deviations from some reference point
- People treat gains and losses differently
  - They are risk averse with respect to profits (i.e., opt for a certain outcome) but accept the risk and are willing gamble if they know that a loss is very likely
  - They have *loss aversion*, i.e., the negative impact of a loss is greater than the positive impact of a profit or gain (an implication of which is the *endowment effect*)
- People are far more likely to adopt strategies that would change the likelihood of an outcome at the extremes (when probability is close to either 0 or 1) than in the middle range
- People making a choice between two alternatives focus on the differences rather than on the similarities

# Where do we go from here?

