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# Decision trees

2017-18

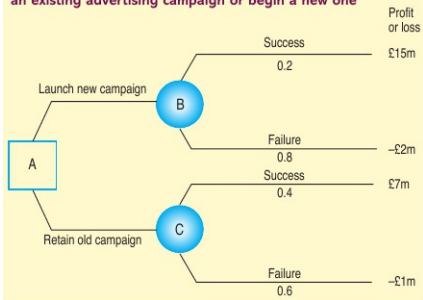
# MAKING DECISIONS

- ▶ When making *decisions* under *uncertainty* → *risk*
- ▶ If there is choice between different decisions  
→ choose action with *highest return*
- ▶ Use *decision trees* to take optimal *action/decision*

## FEATURES OF DECISION TREES

- ▶ *Decision points*: points where decisions have to be made (represented as squares)
- ▶ *Outcomes*: chance nodes (represented as circles)
- ▶ *Probability or chance*
- ▶ *Expected monetary values*

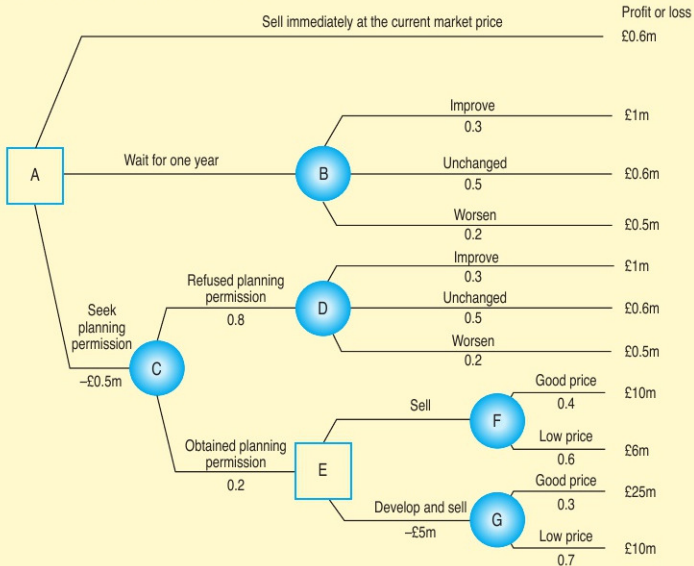
**A simple decision tree based on a decision whether to retain an existing advertising campaign or begin a new one**



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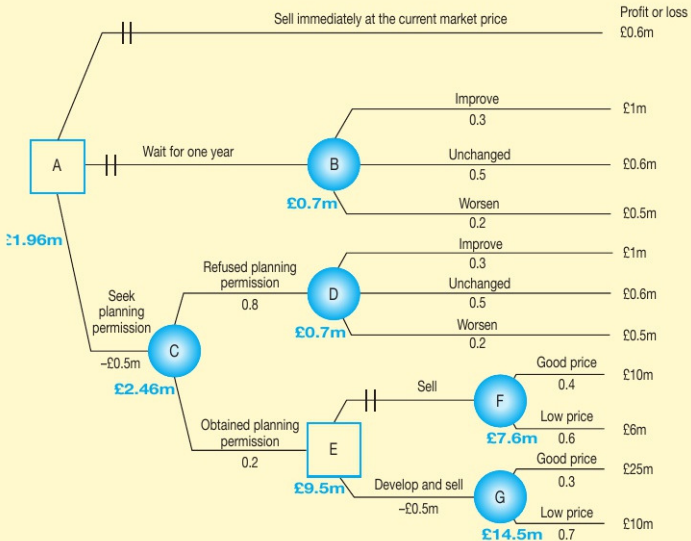
# CALCULATING EXPECTED MONETARY VALUES (EMV)

### The decisions faced by a farmer in the disposal of land



**The final solution**

to the farmer's decision problem (all expected values and unused routes are shown)



# MAKING DECISIONS

## EXAMPLE

- ▶ Retail store that buys T-shirts from Calcutta :
  - ▶  $D_1 = 100$
  - ▶  $D_2 = 150$
  - ▶  $D_3 = 200$
- ▶ Unit cost:
  - ▶ Order is 100 t-shirts → unit cost: Rs. 10
  - ▶ Order is 200 or more t-shirts → unit cost: Rs. 9
  - ▶ Order is 300 or more t-shirts → unit cost: Rs. 8.5
- ▶ *market price* of one unit is Rs. 12.
- ▶ *Unsold* t-shirts are sold in winter sales for half-price

Table : Pay-off Matrix for T-Shirt  
Order Problem

Action (Decision)	Event (State of Nature) : The Level of Demand		
	$D_1$	$D_2$	$D_3$
Order 100 ( $A_1$ )	Rs. 200	Rs. 175	Rs. 150
Order 200 ( $A_2$ )	0	300	600
Order 300 ( $A_3$ )	-150	150	450



## KEY TERMS

- ▶ **Decision tree:** a technique which shows all possible outcomes of a decision. The name comes from the similarity of the diagrams to the branches of trees

# KEY TERMS

## REVISION OF CHAPTER 19

- ▶ **Entrepreneurs:** Individuals who, typically, set up and run a business and take the risks associated with this
- ▶ **Intrapreneurs:** Employees who use entrepreneurial skills, without having to risk their own money, to find and develop initiatives that will have financial benefits for their employer

# KEY TERMS

## REVISION OF CHAPTER 20

- ▶ **Profit maximisation:** An attempt to make as much profit as possible in a given time period
- ▶ **Profit satisficing:** Making enough profit to satisfy the needs of the business owner(s)