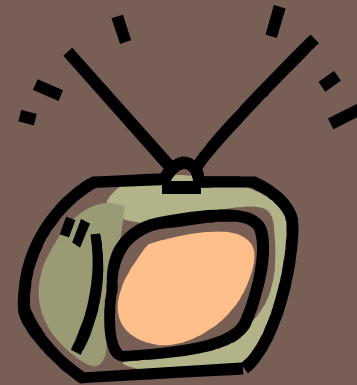


MGT 239

TV PANEL PLANT SIMULATION



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Agenda

- Project background
- Industry background
- Modeling
- Scenarios
- Outcome
- Conclusion



Project background

- 42" LCD TV panel manufacturing
- Future market potential
with 11% growth annually
- Price V.S. supply
- Objective:
 - ▣ Decide whether we should build a plant under different scenarios

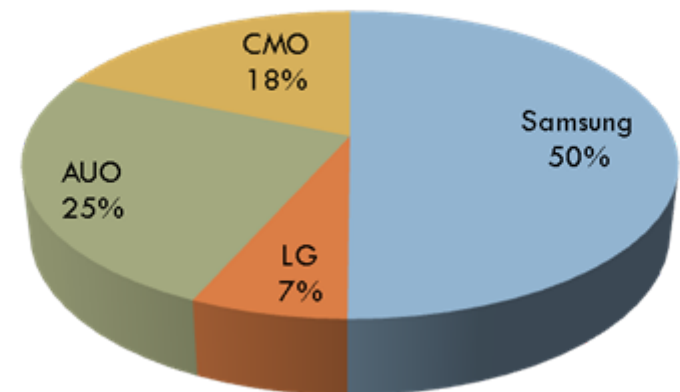


Industry background

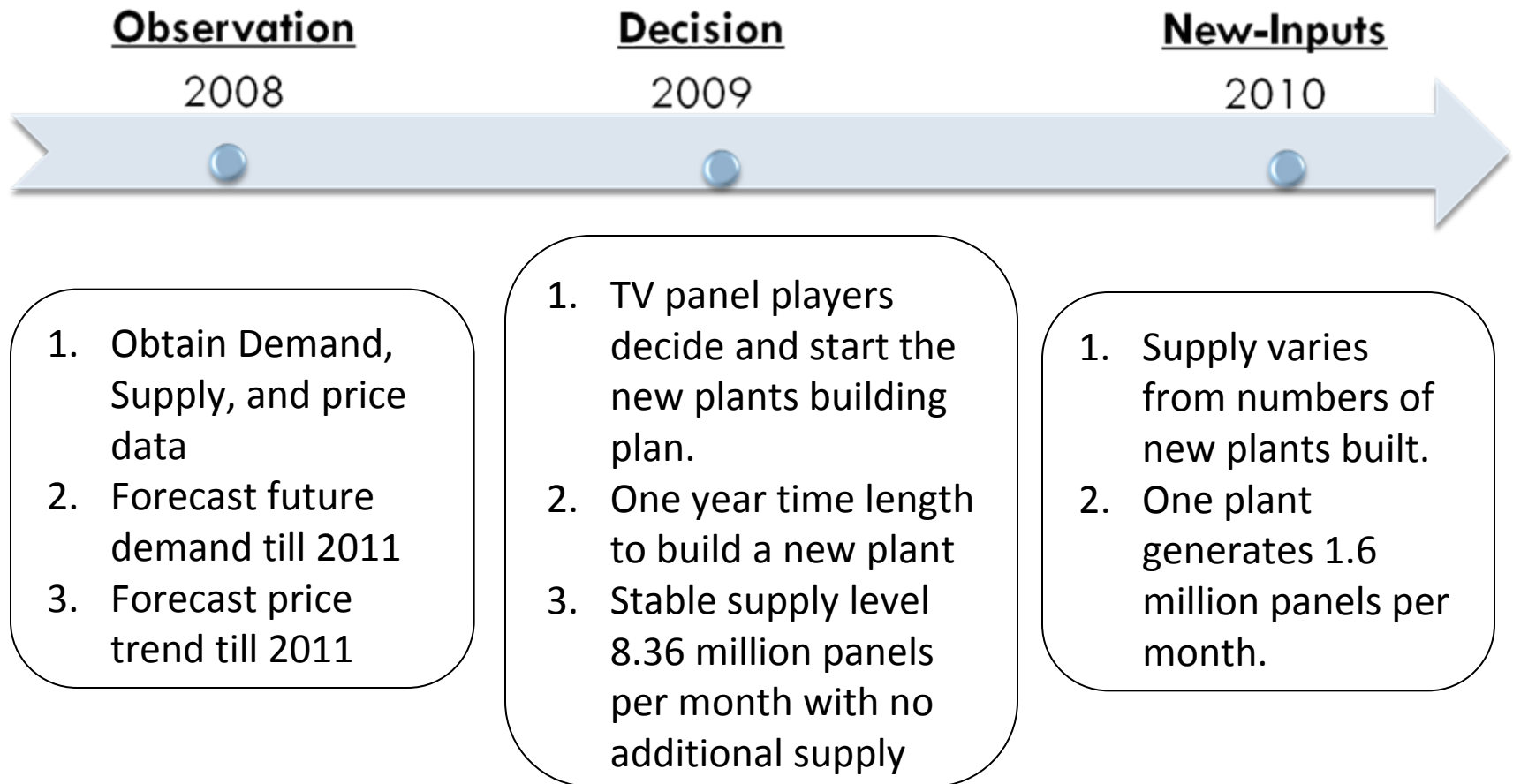
- 4 players
 - ▣ AUO, CMO, LG, SAMSUNG
- Existing total supply in the market
: 8.36 m(units) / month



LCD TV Panel Market share(2008)



Model structure



Assumption

- Additional supply can skim into the market demand.
- Excess demand will be equally distributed to each player who builds the new plant.
- If the demand is lower than 8.36 million, new plant will not produce panels in that month because of no profit generation.
- Maximum capacity for a new plant = 1.6 M

Project Elements/ Parameters

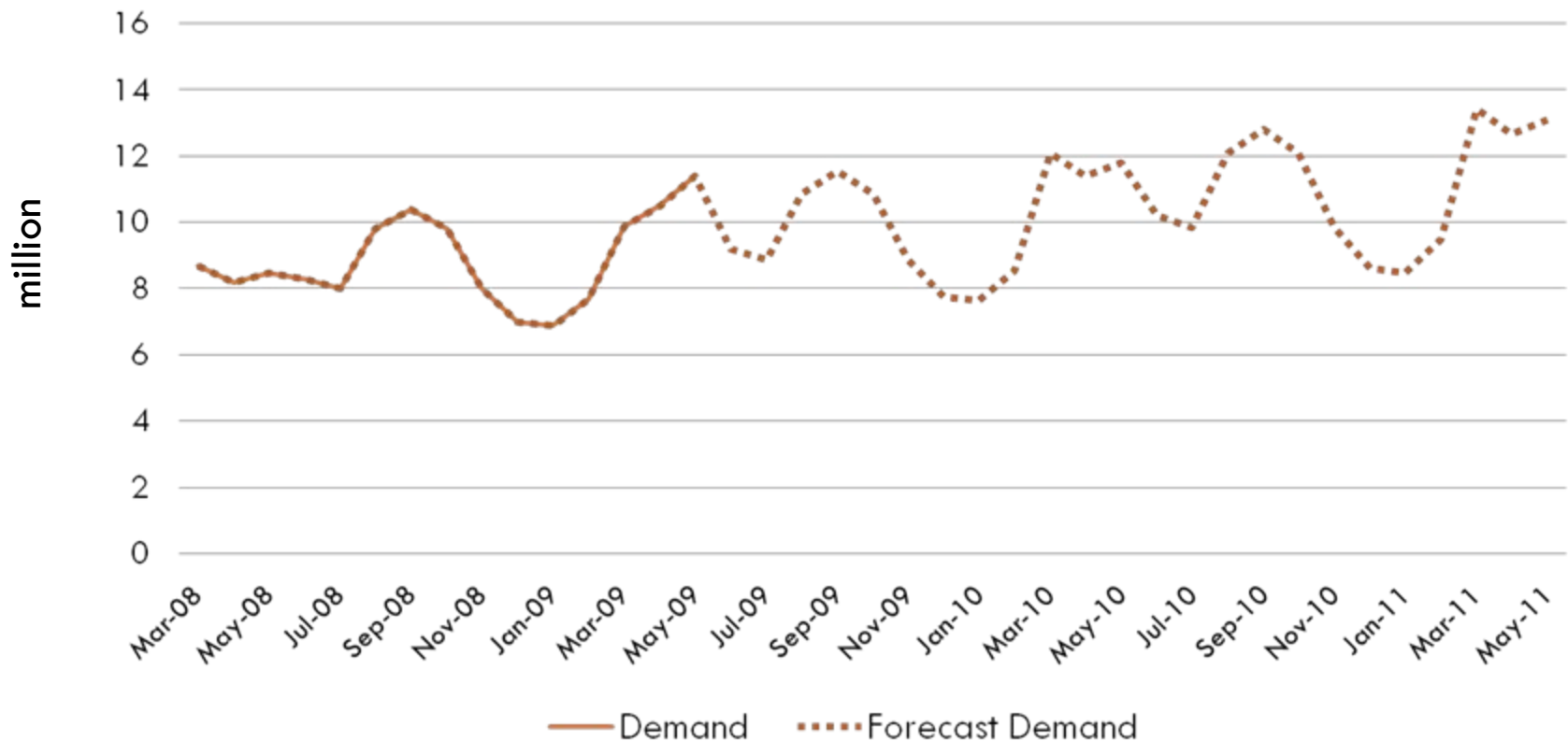
- **D** (demand): The demand of 42" LCD TV panel in 2010
- **S** (Supply): The supply of 42" LCD TV panel
- **P** (Price): The price of 42" LCD TV panel.
- **VC** (variable cost): The VC of 42" LCD TV panel of new plant
- **FC** (fixed cost): The FC of building a new plant.
- **N**: The total number of new plants
- n_1 : total number of our new plants, discrete $U \sim (0, 1)$
- n_2 : total number of competitors' new plants, discrete $U \sim (0, 3)$
- Π (profit): $(P-VC)*(D-8.36m)/N-FC*n_1$

Modeling

Demand Model

- Forecast the monthly demand

Assume (growth rate=11%)



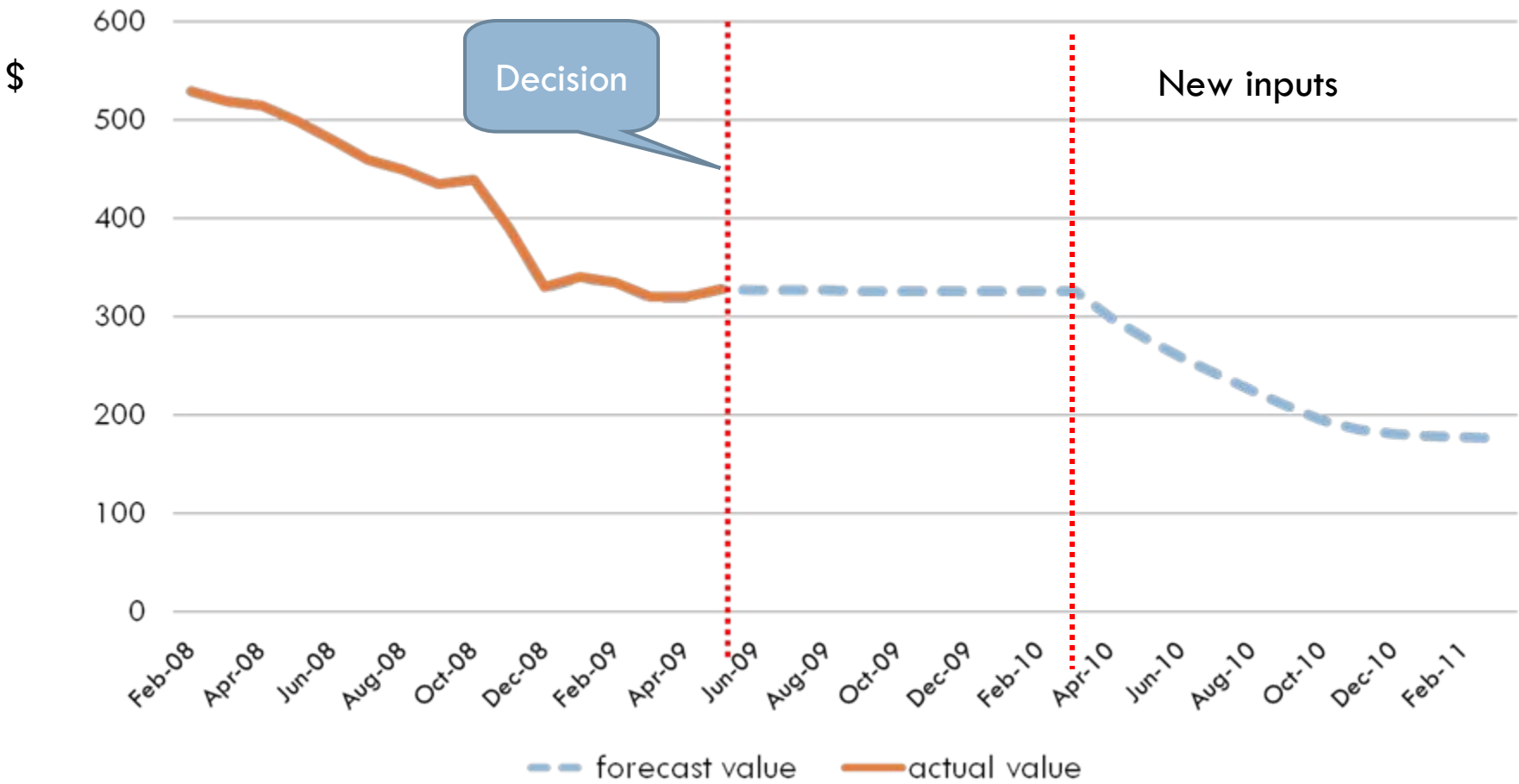
Price Model (Regression)

□ **Price = 326.17**
+ ((Supply) * -21.34)
+ ((Previous price) * 0.547676)

Audit Trail -- Coefficient Table (Multiple Regression Selected)						
Series Description	Included in Model	Coefficient	Standard Error	T-test	P-value	Overall F-test
Price	Dependent	326.17	104.40	3.12	0.01	170.41
Supply	Yes	-21.34	6.90	-3.09	0.01	
Previous price	Yes	0.55	0.14	3.97	0.00	

□ **R square = 96.6%**

Price and price forecast



Conditions

- Profit= $(P-VC)*(D-8.36)/N-FC$
- Total new plant supply= Σ utilization rate* maximum capacity
- Total Supply=8.36 million + Total new plant supply
- VC: \$180/unit
- Build cost: \$1,800 m
- Depreciation life span=10 years
 - ▣ FC=\$180m annually

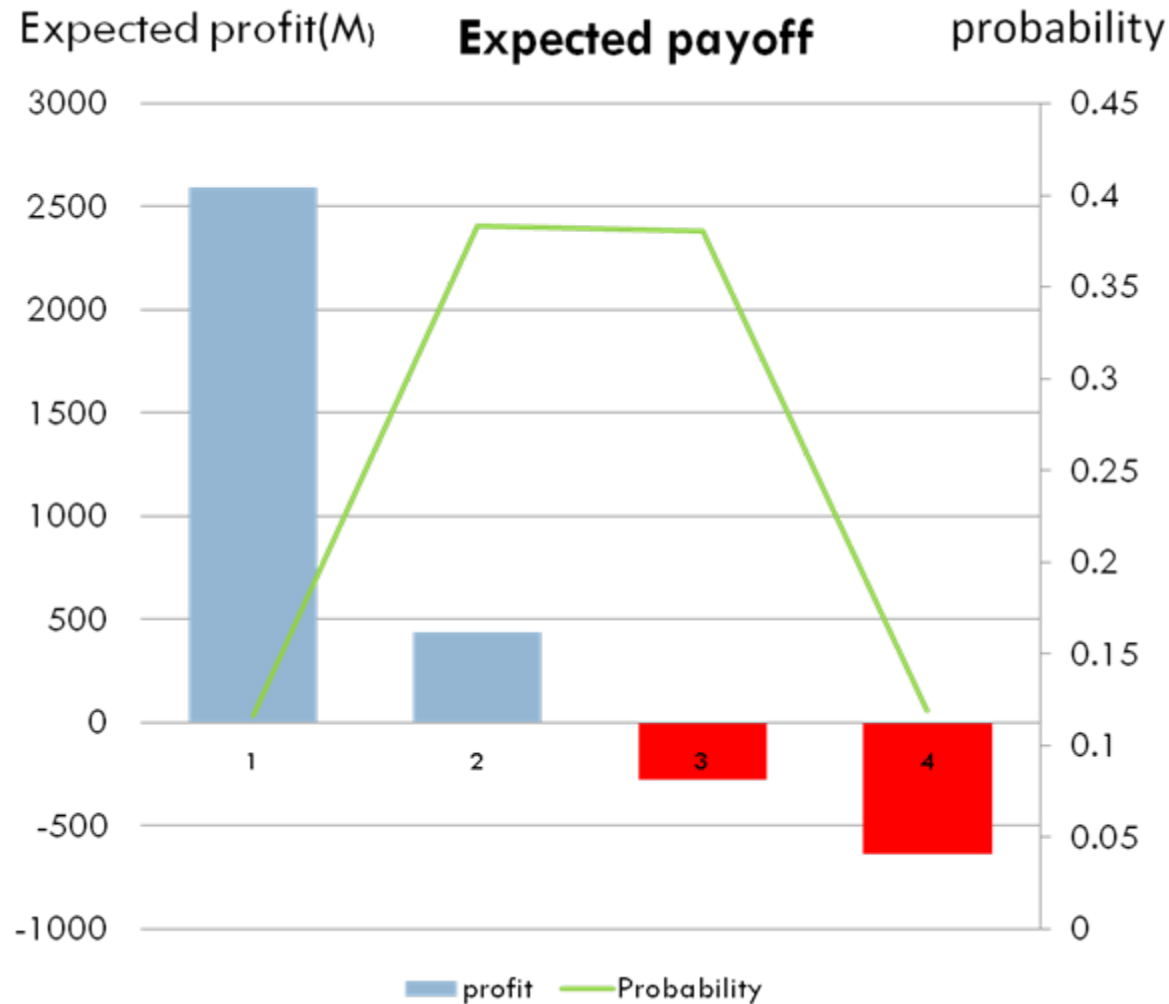
EXE8-Revenue evaluation for a new TV panel plant

Scenario 1

- 1. Assume the probability of building a plant is equal for all players.
- 2. learning curve is the same for all players
 - ▣ New plant Utilization by month:
(0.4,0.5,0.6,0.7,0.8,0.9,1.0)
- Sample size (replications)=4000
- Q1: What are the Expected profit under $N=1, 2, 3, 4$, and their 95% CIs, respectively? Graph the distribution (histogram) of the Expected profit?
- Q2: what is the Expected number of plants in the model and 95% CIs?
- Q3: what is the downside risk, $P(\text{profit} < 0)$?

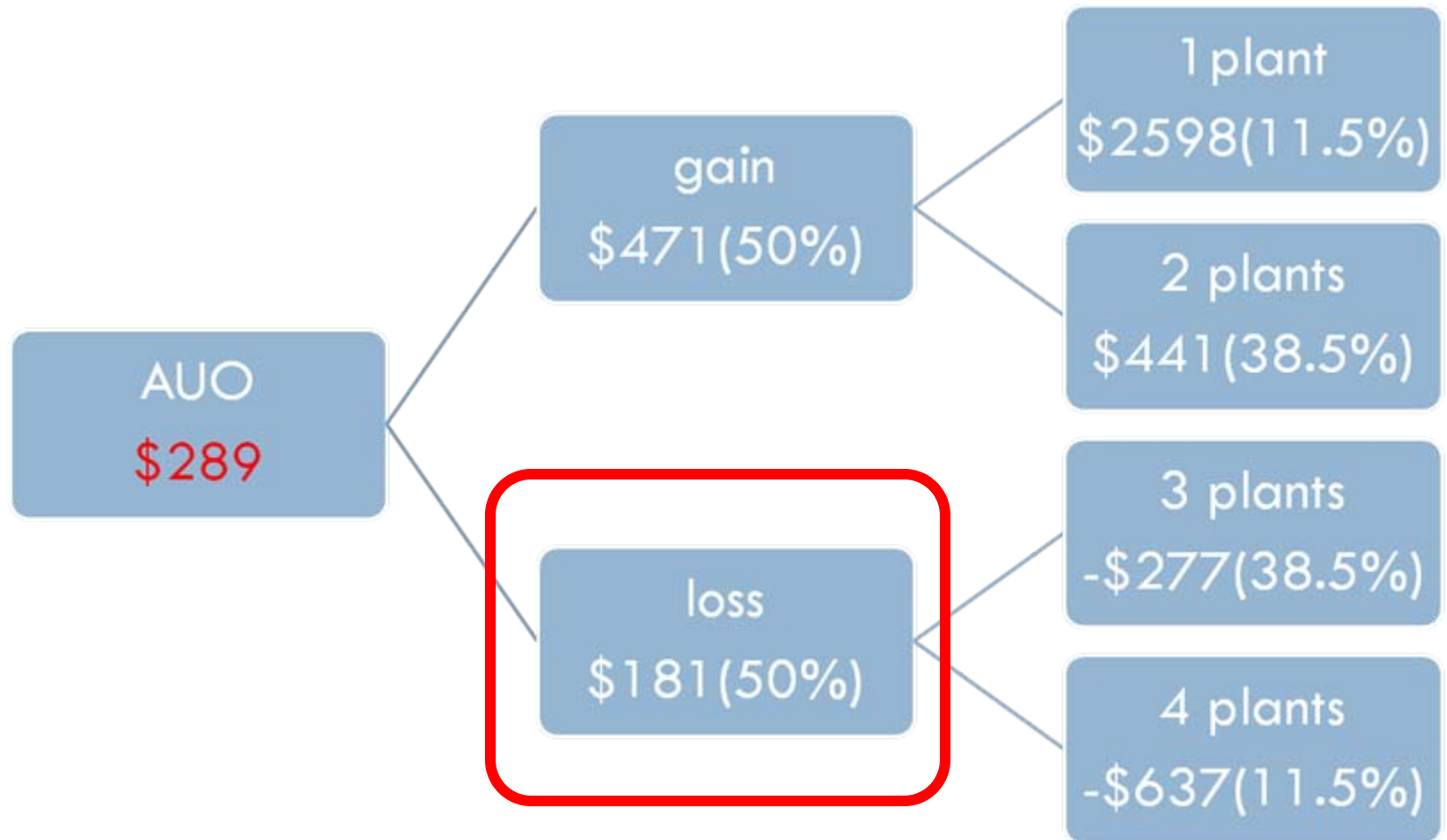
Scenario 1 -Solution

	Profit	New plant
Expected value	289.91	2.50
Std	924.67	0.84
95% err	24.04	0.02
LCI	265.86	2.48
UCI	313.96	2.52



#of plants=1 → no competitor will build

Scenario 1 - Summary



Downside risk

EXE8-Revenue evaluation for a new TV panel plant

Scenario 2

- 1. Assume the probability of building plant is different for every player.

Player	Probability
CMO	0.3
Samsung	0.7
LG	0.2

- 2. learning curve is different for all players

		Beginning	increase monthly
Learning curve for each player	AUO	$U_1 = U(0.35, 0.45)$	$U_{n+1} = U_n * (1 - U_n) + U_n$
	CMO	$U_1 = U(0.25, 0.40)$	$U_{n+1} = U_n * (1 - U_n) + U_n$
	Samsung	$U_1 = U(0.35, 0.45)$	$U_{n+1} = U_n * (1 - U_n) + U_n$
	LG	$U_1 = U(0.20, 0.35)$	$U_{n+1} = U_n * (1 - U_n) + U_n$

EXE8-Revenue evaluation for a new TV panel plant

Scenario 2

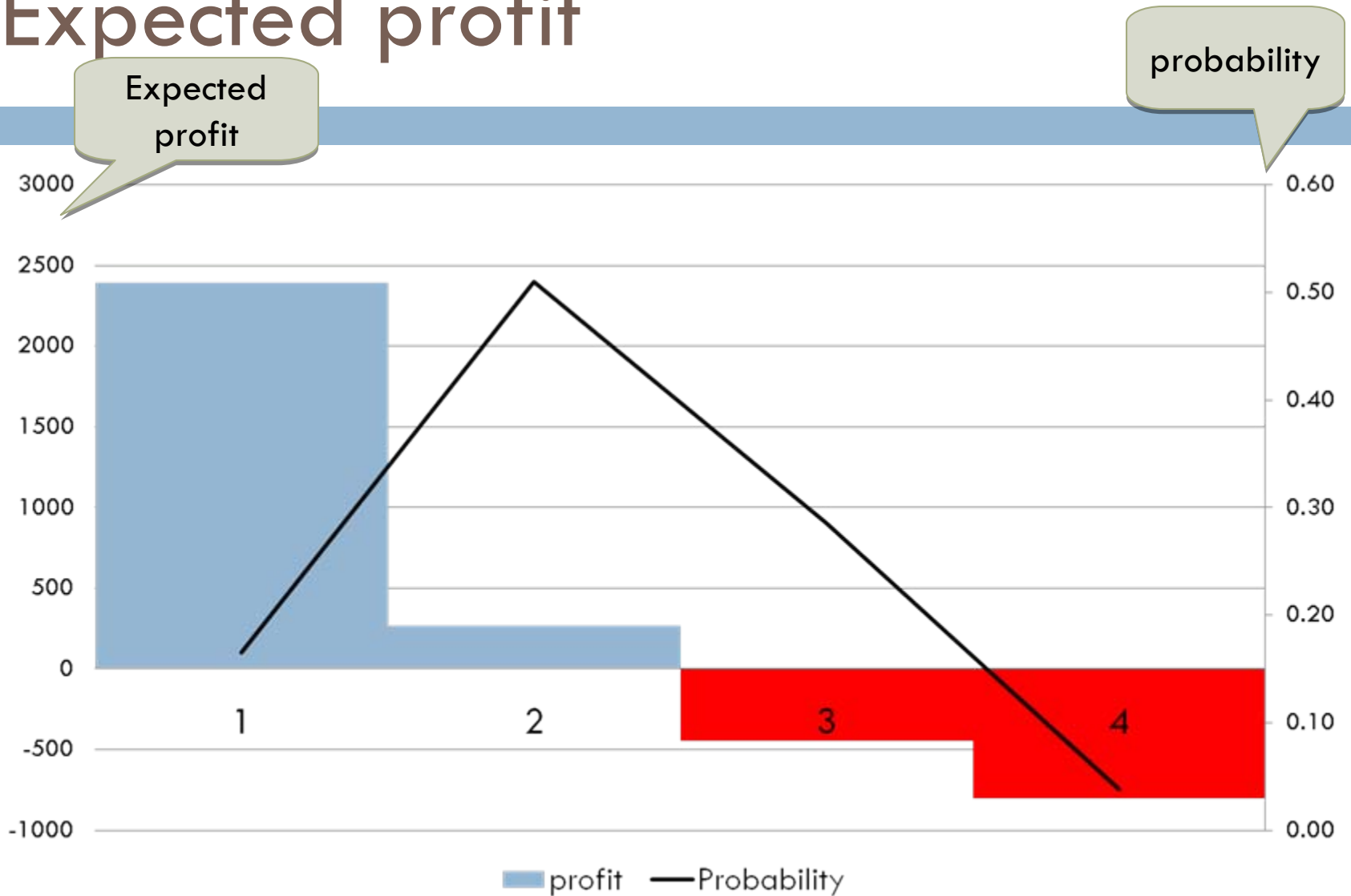
- Sample size (replications)=4000
- Q4: repeat Q1 to Q3 under scenario 2
- Q5: Consider these two scenarios and find your optimal strategy
- Q6: Based on the expected profit under 2 scenarios, should AYO apply 1st- or 2nd scenario to build the new plant? Why

Scenario2-Solution

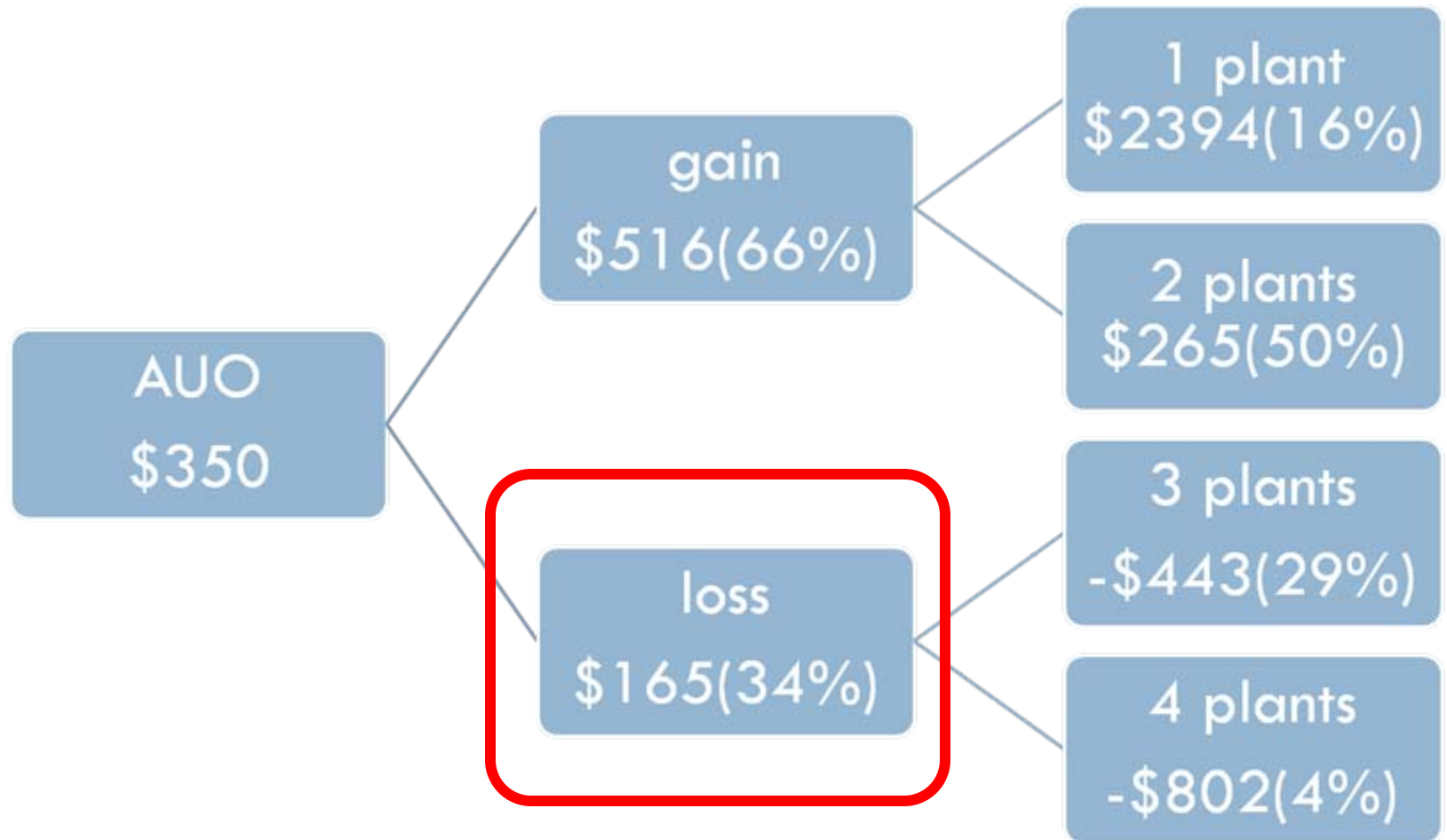
	Profit	New plant
Expected value	350.88	2.22
Std	957.16	0.76
95% err	24.89	0.02
LCI	325.98	2.20
UCI	375.77	2.24

# of plants	frequency	profit	Probability
1	640	2394.169	0.16
2	2009	265.4498	0.50
3	1176	-443.568	0.29
4	175	-802.351	0.04

Expected profit



Outcome



Downside risk

Conclusion

- Optimal strategy of 2 scenarios:
 - ▣ AUC should build a new plant
 - ▣ Risk management
- Consider real market power, scenario 2 is more reliable.

- Submit MGT239_EXE8_longCao before 11:20

THANK YOU

