

Mosaic is evaluating a manufacturing plant that has the potential to generate revenue of \$2 million per year. Based on uncertainty surrounding its long term government contract, next year's revenue will either increase by 20% or decrease by 25%, with equal probability and then stay the same forever. Mosaic projected that the costs will be constant at \$1.2 million per year. Next year, Mosaic has the option to sell the plant for \$3 million. Its cost of capital is 20%. Assume a zero tax rate and perpetual cash flows.

10) What is the expected value of the plant with the option to sell it?

- A. \$3.75 million
- B. \$3.90 million
- C. \$4.25 million
- D. \$4.50 million

Answer: C

■ 50% Possibility: Revenue $\$2\text{m} \times (1+20\%) = \2.4m

	t0	t1	...
Revenue		2.4	2.4
Cost		(1.2)	(1.2)
NPV@20%	6		

In this case, perpetual cash flows are assumed. The net present value formula of the perpetual annuity is $\text{NPV} = A/r = (\$2.4\text{m} - \$1.2\text{m})/20\% = \$6\text{m}$

$\text{NPV}(@t_0)$ of selling the plant next year $= \$3\text{m}/(1+20\%) = \2.5m

A rational businessman would choose the option with higher NPV, which is to continue to operate the plant.

■ 50% Possibility: Revenue $\$2\text{m} \times (1-25\%) = \1.5m

	t0	t1	...
Revenue		1.5	1.5
Cost		(1.2)	(1.2)
NPV@20%	1.5		

$\text{NPV}(@t_0)$ of continuous operation $= (\$1.5\text{m} - \$1.2\text{m})/20\% = \$1.5\text{m}$

$\text{NPV}(@t_0)$ of selling the plant next year $= \$3\text{m}/(1+20\%) = \2.5m

A rational businessman would choose the option with higher NPV, which is to sell the plant.

■ Using expected value method, the expected value of the plant with the selling option $= \$6\text{m} \times 50\% + \$2.5\text{m} \times 50\% = \4.25m

11). What is the value of the option to sell the plant?

- A. \$0.5 million
- B. \$0.75 million
- C. \$1.25 million
- D. \$1.5 million

Answer: A

NPV with the selling option $= \$6\text{m} \times 50\% + \$2.5\text{m} \times 50\% = \$4.25\text{m} = \$4.25\text{m}$

NPV without the selling option $= \$6\text{m} \times 50\% + \$1.5\text{m} \times 50\% = \3.75m

The value of selling option $= \$4.25\text{m} - \$3.75\text{m} = \$0.5\text{m}$