Discounted Cash Flow (DCF)

In the model below, the sources of risk are the revenue growth rate and variable costs as a percentage of revenue or sales. The base case for annual growth rate is assumed to be 5%, varying based on a Normal distribution with volatility (or standard deviation) of 7.5%. Annual fixed cost is assumed to be a flat 35M. It's further assumed variable cost is most likely to be 40% of revenue and will vary within a min-max range. The distributions are assumed to be skewed (or slanted in a specific direction) in this case and parameters have been chosen to reflect the assumption that the variable cost % is more likely to exceed rather than fall below the base case of 40%. Pert (which stands for Program Evaluation and Review Technique) distributions are applicable to describe the variable cost % for each year as shown in the respective row below.

After taking into account the assumed investment outlay, and applying a discount factor based on a hurdle rate, the DCF and Net DCF are derived. The Net DCF is entered as an @RISK output as well as a bonus payment assumed to be paid whenever the Net DCF is larger than $50M. The Net DCF is estimated by running 1,000 iterations of the model using @RISK. Following the simulation in this example, the average (mean) of the Net DCF (commonly referred to as the net present value or NPV) is positive , whereas the probability of a negative DCF is more than 10%. The decision as to whether to proceed or not with this project will therefore depend on the risk perspective (tolerance) of the decision-maker.

The model also uses some of the @RISK Statistics functions (RiskMean, RiskTarget, RiskTargetD) to work out the average Net DCF, the probability that the Net DCF is negative and the probability that a bonus is paid.

In Millions		1	2	3	4	5	10
Revenue		$100.0	**$105.0**	**$110.3**	**$115.8**	**$121.6**	**$127.6**
% growth rate			5.0%	5.0%	5.0%	5.0%	5.0%
average			5.0%	5.0%	5.0%	5.0%	5.0%
volatility			7.5%	7.5%	7.5%	7.5%	7.5%
Fixed Cost		**$35.0**	**$35.0**	**$35.0**	**$35.0**	**$35.0**	**$35.0**
Variable Cost		**$40.8**	**$42.9**	**$45.0**	**$47.3**	**$49.6**	**$52.1**
Variable Cost %		40.8%	40.8%	40.8%	40.8%	40.8%	40.8%
minimum		35%	35%	35%	35%	35%	35%
most likely		40%	40%	40%	40%	40%	40%
maximum		50%	50%	50%	50%	50%	50%
Profit/Cash Flow		**$24.2**	**$27.1**	**$30.2**	**$33.5**	**$36.9**	**$40.5**
Hurdle Rate	12%						
DCF		$127.5					
Investment		$100.0					
Net DCF (NPV)		$27.5		Average	$27.4		
				p(<=0)	10.8%		
Bonus threshold		$50.0					
Bonus		$0.0		Average	$2.0		
				p(>0)	16.4%		

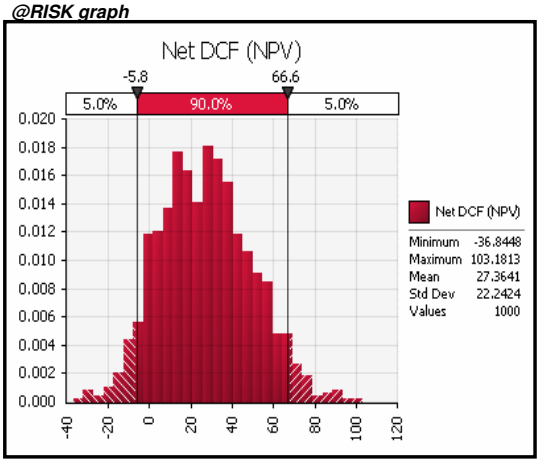
Cell Formula Notes:

E27=RiskNormal(E28,E29), F27=RiskNormal(F28,F29), etc.
D33=RiskPert(D34, D35, D36), E33=RiskPert(E34, E35, E36), etc.
D42=RiskOutput("Net DCF (NPV)")+D40-D41
G42=RiskMean(D42)
G43=RiskTarget(D42,0)
D46=RiskOutput("Bonus")+MAX(0,D42-D45)
G46=RiskMean(D46)
G47=RiskTargetD(D46,0)

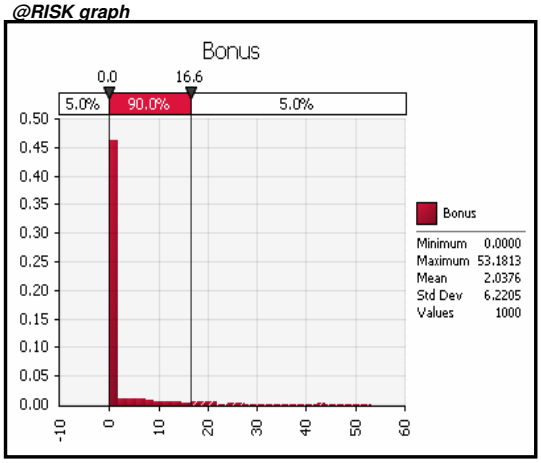
Prepared by David Koegel Associates, Inc.

Loss Results

@RISK graph



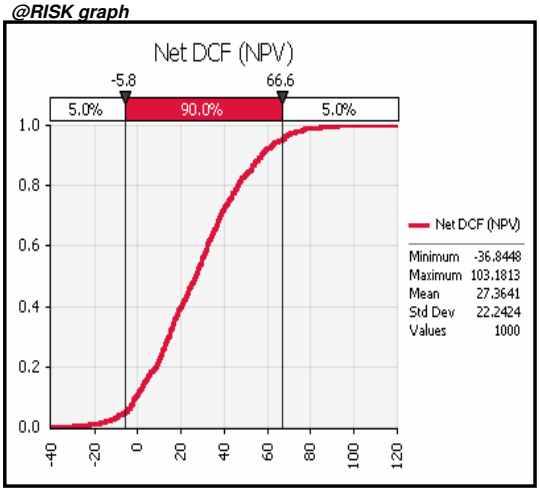
@RISK graph



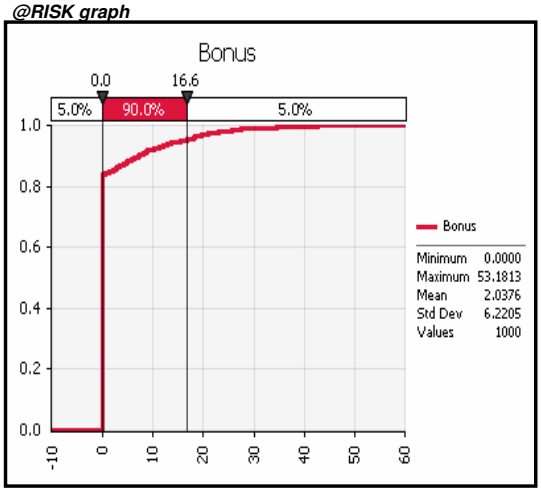
Statistic	*Value*
Min	($37)
Max	$103
Mean	$27
StdDev	$22
90th P (worst)	($1)
95th P (worst)	($6)
99th P (worst)	($19)
P(Net DCF <= 0)	11%

Statistic	*Value*
Min	$0
Max	$53
Mean	$2
StdDev	$6
90th P	$7
95th P	$17
99th P	$29
P(Bonus > 0)	16%

@RISK graph



@RISK graph



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