HOW TO: Recognize and Correct the Flaw of Averages

Think of uncertain numbers as distributions of possible outcomes, and think of distributions as shapes. The normal distribution with its bell curve shape is a well-known example, but there are many other distributions that you can use in your business analyses. A distribution can be seen in a histogram, or a bar graph that depicts the relative likelihoods (i.e., probabilities) that the uncertain number will take on various values.

Apartment complex purchase: Good or bad investment?

Dark Ages Analysis

You are an executive with a small property management firm and are considering whether or not the purchase of an apartment complex is a good investment for your firm. The complex has 80 units. Historical data indicate that the number of units rented in a given month has been between 60 and 80. The rent per unit, which you are not likely to change since demand is very price sensitive (i.e., lots of cheap, undifferentiated apartments are available in this market), is $1,200 per month. Monthly expenses for the entire complex have been as low as $64,000 and as high as $78,000.

Data		Parameters		
Total units	80	N/A		
Average # units rented per month	70	Min 60	Max	80
Rent per unit	$1,200	N/A		
Average ops expenses per month	$71,000	Min $64,000	Max	$78,000
Calculations				
Revenue	$84,000			
Profit	$13,000			

Q: What is the expected monthly profit?
A: $13,000.

Q: What is the probability of making a profit in any given month?
A: I'm not sure what you mean. Isn't profit $13,000 per month?

**Q:** Suppose your debt payment on this complex will be $6,000 per month. Would you still make this investment?
A: Yes, I probably still would make this investment since I could expect to earn $7,000 per month in profit.

Decision: For simplicity's sake, let's call this a "good investment." ➔ Purchase.

Information Age Analysis

You are an executive with a small property management firm and are considering whether or not the purchase of an apartment complex is a good investment for your firm. First, you would like to perform a risk analysis. The complex has 80 units. Historical data indicate that the number of units rented in a given month has been as low as 60 and as high as 80, but, in what could be a red flag, you expect occupancy to hover around 76% based on a closer look at the data. The rent per unit, which you are not likely to change since demand is very price sensitive, is $1,200 per month. Monthly expenses for the entire complex appear to be normally distributed, with mean $71,000 and standard deviation $3,500.

Distributions of inputs

Units rented per month

Ops expenses per month
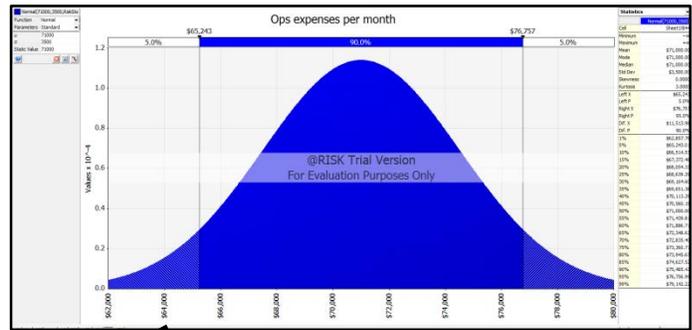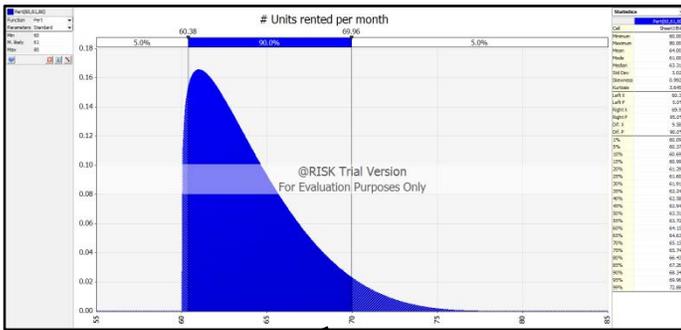
Data		Parameters						Distribution
Total units	80	N/A						Fixed
# Units rented per month	64	Min	60	Most likely	61	Max	80	PERT
Rent per unit	$1,200	N/A						Fixed
Ops expenses per month	$71,000	Mean	$71,000	Std dev	$3,500			Normal
Calculations								
Revenue	$76,800							
Profit	$5,800							

Distribution of output
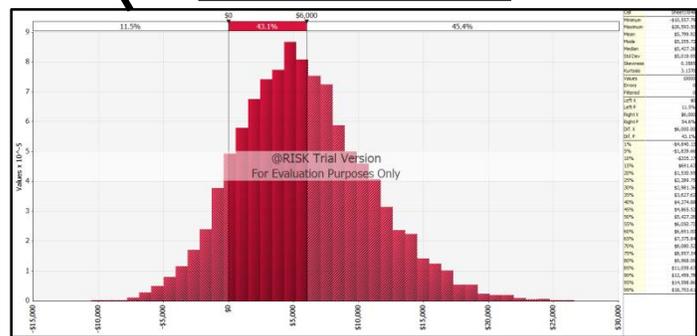
Q: What is the expected monthly profit?

A: I built a Monte Carlo simulation model using @RISK and ran 10,000 iterations (i.e., simulated 10,000 months). The mean, or expected, profit is $5,799.92, or approximately $5,800 per month.

Q: According to the simulation results, what is the probability of making a profit in any given month?

A: The probability of making a profit in any given month is 88.5%.

Q: Suppose your debt payment on this complex will be $6,000 per month. Would you still make this investment?

A: The standard deviation of the profit is $5,019.95, or 86.6% of the expected profit, which indicates a high degree of variation (i.e., uncertainty). Assuming a minimum profit of $6,000 in order to cover the monthly debt payment and break even, there is only a 45.4% probability of making a profit in any given month. This is way too low for my risk appetite. On average, I should expect to lose $200 per month after the monthly expenses and debt payment. Therefore, I do not feel comfortable that I will make money over the long run and so I will not make this investment.

Decision: This looks like a "bad investment." → Do not purchase.

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