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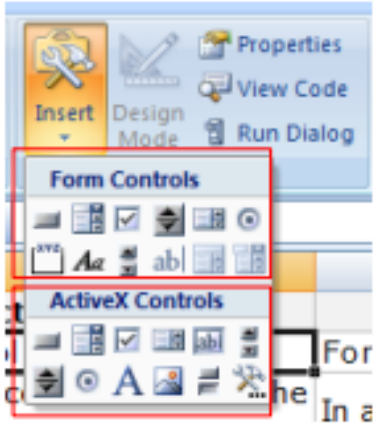
Macros – II

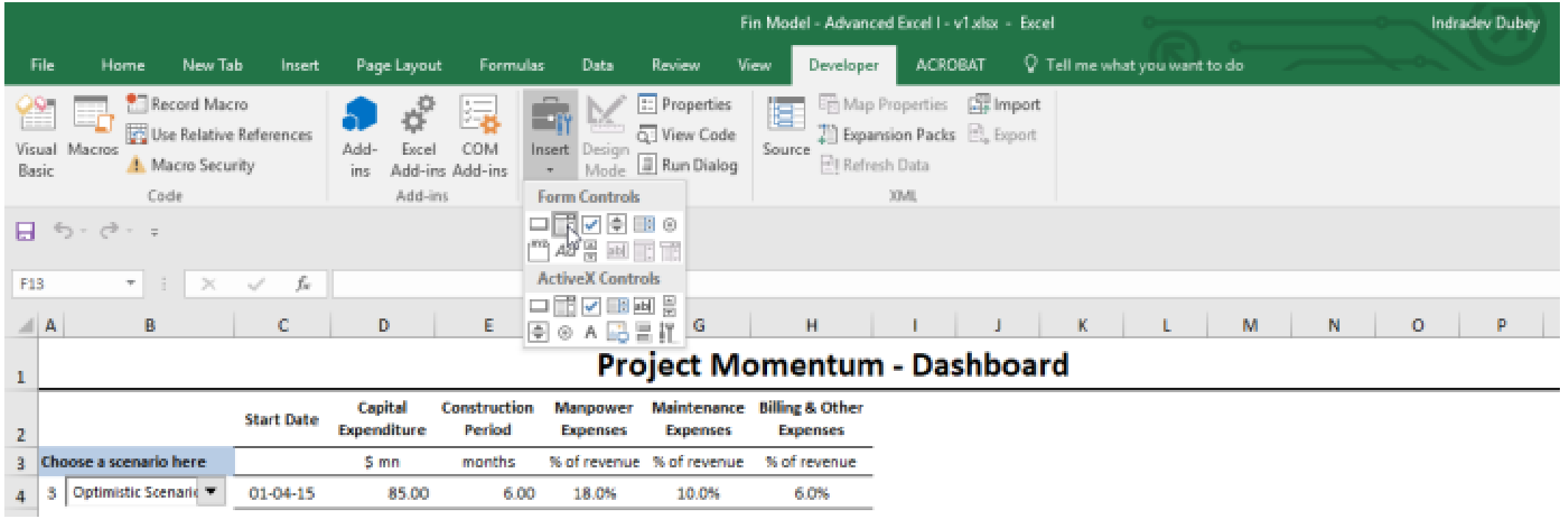
Form Controls and Active X controls

	ActiveX Controls	Form Controls
Toolbar	Control Toolbox	Forms
Macro code storage	In the code module for the Sheet	In any standard VBA module
Macro name	Corresponds to the control name (e.g., CommandButton1_Click)	Any name you specify.
Correspond to...	UserForm controls	Dialog Sheet controls
Customization	Extensive, using the Properties box	Minimal
Respond to events	Yes	Click or Change events only
Inserting	Design Mode	Normal
Assigning Macros	No Arbitrary Macro Can be assigned	Macros can be assigned

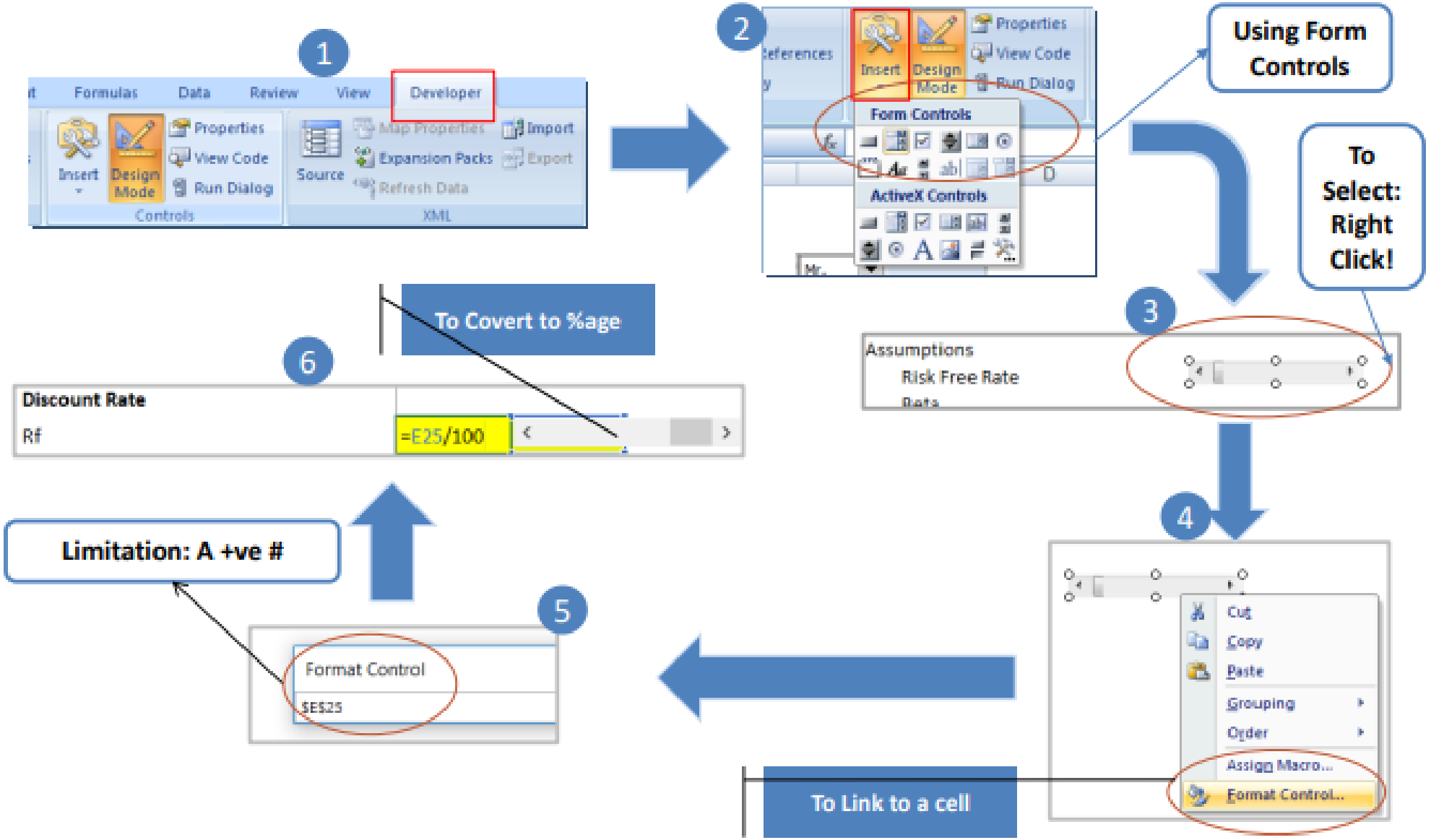


Project Momentum – Scenario Dropdown

- Go to PDashboard (Par_01)
  - For scenario, go to Developer => Insert => Form controls and NOT Active X Controls => Choose Combo box
  - Format the control of this box
    - For Input range, choose the five scenarios when they first appear on PDetails sheet
    - For cell link, use the cell A4 just on LHS of the scenario box



Creating a Model for CAPM – PModel-M (Par 02)

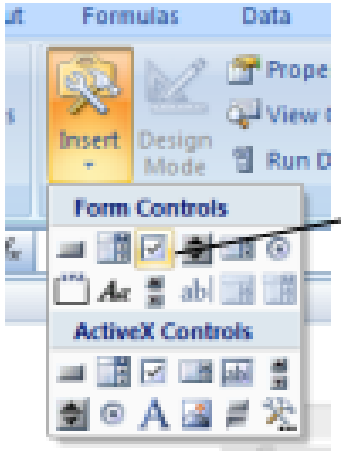


Linking the Model

β

=E27/10

A Linear Transformation to generate desired output

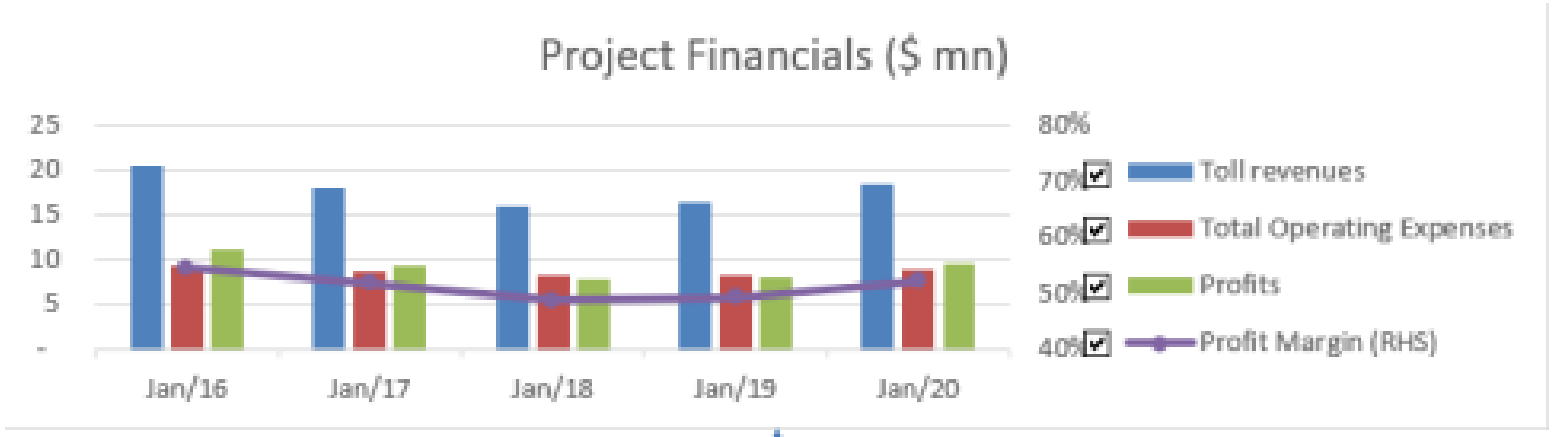


Different Controls can be used for different user inputs

11	**Discount Rate**	
a	Rf	5.0%
b	Rm	8.0%
c	β	1.0
d	**Ke**	=D25+D27*(D26-D25)

Based on the User Inputs, Generate the return Expectation

Creating Flexible Charts – Project Finance



Create the Chart Based on the Data

Use Par_03

Creating Flexible Charts – Project Finance

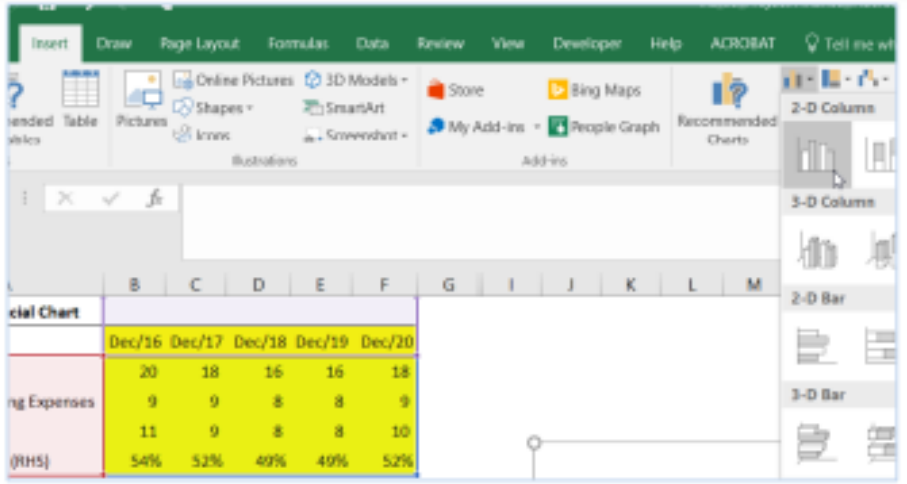
- Creating Flexible Project Financials chart
- Data Required:
  - Toll Revenue
  - Total Operating Expenses
  - Profits
  - Profit Margins
- Get the required data at one place (PL&G)

	A	B	C	D	E	F
40	**Project Financial Chart**					
41	Period	Dec/16	=B37			
42	Toll revenues	20	='PModel-Y'!E5			
43	Total Operating Expenses	9	='PModel-Y'!E12			
44	Profits	11	='PModel-Y'!E13			
45	Profit Margin (RHS)	54%	='PModel-Y'!E13/'PModel-Y'!E5			

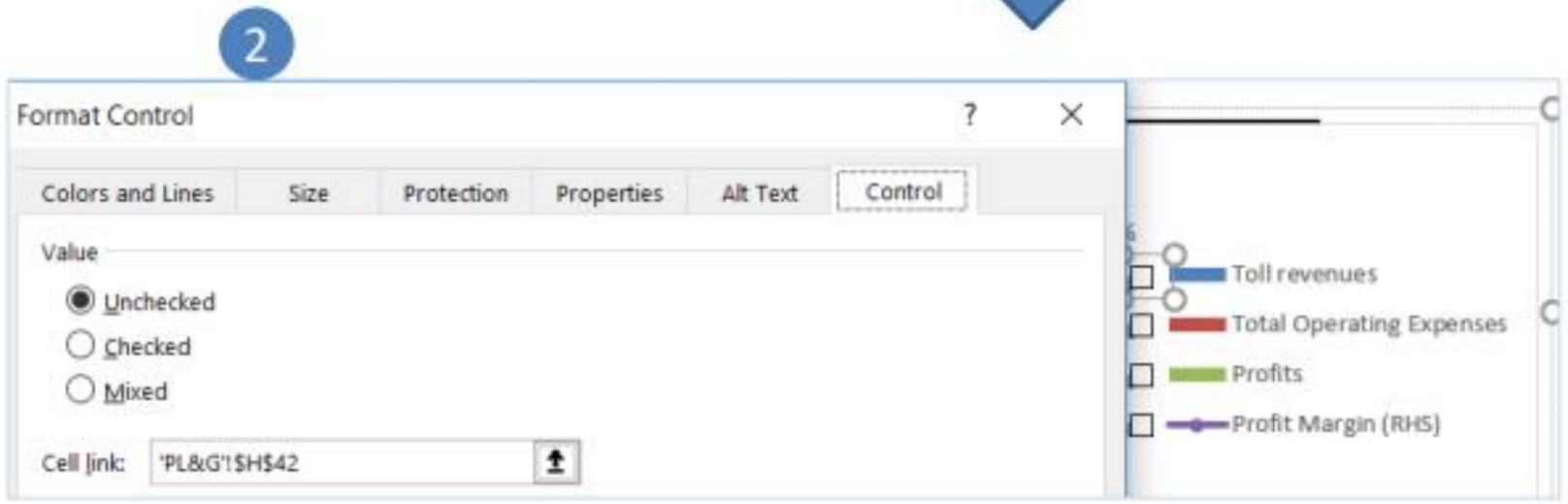
	A	B	C	D	E	F
40	**Project Financial Chart**					
41	Period	Dec/16	Dec/17	Dec/18	Dec/19	Dec/20
42	Toll revenues	20	18	16	16	18
43	Total Operating Expenses	9	9	8	8	9
44	Profits	11	9	8	8	10
45	Profit Margin (RHS)	54%	52%	49%	49%	52%

Creating Flexible Charts – Project Finance

- Creating Flexible Project Financials chart
- Select the data and create 2-D column chart
- Change the axis and chart type of "Profit Margin"
- Edit the Chart title, delete gridlines
- Edit secondary axis (if required)
- Move Legend to Right side



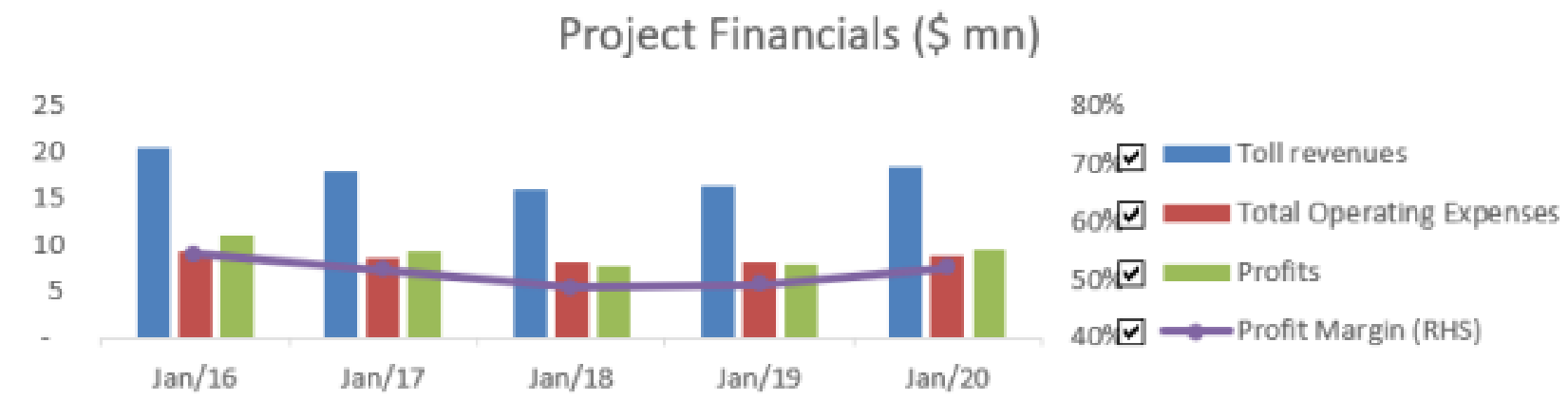
Create Decision controls and link to cells



Linking Data to decision

40	**Project Financial Chart**		
41	Period	Dec/16	=B37
42	Toll revenues	20	=IF(P42=TRUE, 'PModel-Y'!E5,0)
43	Total Operating Expenses	9	=IF(P43=TRUE, 'PModel-Y'!E12,0)
44	Profits	11	=IF(P44=TRUE, 'PModel-Y'!E13,0)
45	Profit Margin (RHS)	54%	=IF(P45=TRUE, 'PModel-Y'!E13/'PModel-Y'!E5,0)

If the appropriate series is selected, show the value, else hide



Steps to be followed in v5

- Understanding Simulation

- Let's say there are two nodes A and B
  - There are literally infinite number of ways to move from one node to another
  - If there are "m" such nodes, just see how many different paths a variable can take to move from first node to mth node
  - Each such path will be a combination of one out of infinite path to move from one node to another.
- **Simulation:** how randomly traffic can move from month 1 to month 60 (entire concession period)
  - Simulating the entire path traffic will take to move from month 1 to month 60
- Predicting as many potential paths as we think is right in this situation
  - Then, figure out what is the NPV or any other decision criteria values under each path
  - Simulation can then help up predict that if starting traffic is T and if it's allowed to move completely randomly, in how many cases NPV will be greater than 0
  - This tells in general that this project will be value accretive in x% of cases

Simulation Requirement

- Simulation helps you anticipate the behavior of a variable in a totally random fashion
- It subjects a model to a multiple instances of hypothetical situation and helps user predict most likely item
  - Simulation can help you figure out whether a design will survive the test of parameters it's subjected to
  - Let's say metallurgy department proposes using another material for steel while making a building
  - The another material now needs to be subjected to all the stress that currently steel is subjected when used in the building to figure out whether this substitute is worth replacing steel
  - Only way to do this is build a building with this material instead of steel and examine the results
    - But if you do that and if the material doesn't survive the test, the building will collapse leading to loss of lives
  - This entire thing can be actually predicted if real life situations can be established in a laboratory and a model building using this substitute material is subjected to those situations and results examined
  - Simulation helps you achieve exactly this task
    - Simulation tells you in how many cases this material can survive the stress and then leave it to the user to decide whether he/ she wants to take the risk
- Portfolio managers use Simulation to establish VaR
- Car manufacturers subject all their innovation in design to simulation to establish confidence level for achievement of a particular performance

Creating PDashboard

Simulation provides a direction to an approach to handle an otherwise non directional variable

- In PDashboard. Add the text:
  - "Do you wish to run simulation on traffic?"
  - "Enter instances of simulation"
  - "Enter month 1 traffic"
  - Put the command button and edit the text in it
  - The macro button will prompt user to select the simulated scenario if user has not done so. Otherwise it will run the simulation.
- Before unfolding the macro, let's look at the basic methods of writing a macro code:
  - All variables going to be used in the macro needs an introduction
    - Variable can be integer, value, double and so on
    - Variables are introduced using Dim command and Multiple variables can be introduced using single Dim
    - A cell is identified by a macro as Cells (Row number, Column number)
      - Macro sheet name and code sheet name are two different things
      - One can code using macro sheet name (sheet 1, sheet 2 etc.) as displayed by Excel VB object
    - To use existing functions of excel (say max function) in a macro, use the command: Application.worksheetfunction.max (_____,_____,____)

Cont'd…

- Structure of the code:
  - To pick up the month 1 traffic (traffic1) input by us, calculate month 2 traffic (traffic2) by applying a random growth between 2% ± 1%
  - This random growth is calculated by using a random number between -1 and 1
    - Use functions RAND() and RANDBETWEEN()
    - RANDBETWEEN generates only integral random numbers between chosen limits
    - Use RANDBETWEEN(-100,100) / 100 to generate negative and positive fractional numbers between -1 and 1
    - Growth function now becomes, g = 2% + randbetween (-100,100) / 100 x 1% = 2 / 100 + randbetween(100,100) / 100 x 1 / 100
  - While traffic is growing at this rate, in no month, traffic will exceed the designed capacity of 1 mn: Use MIN
  - Use counter (j) for traffic across 60 months
    - Commands will be for j = 1 to 60
    - For every iteration, traffic for entire 60 months needs to be calculated, updated in the excel sheet PDetails under Simulated Scenario, outputs like NPV, IRR and Payback calculated and documented in one sheet (which is PSimulation) in our case
    - The macro will move to next iteration and repeat the same steps
    - Macro needs to do this for number of iterations identified by the user
    - Use another counter "i" for iteration and repeat calculations for i = 1 to n
    - Identify the variables involved: i, j as integer for counters, n as integer to read no. of instances of simulation and Traffic1 to read the month 1 traffic specified by user

Coding the Macro

```
Private Sub Simulation_Click()
If Not Worksheets("PDashboard").Cells(4, 1) = 5 Then
        MsgBox "Sorry, you can Run Traffic simulation only when you select Simulated Scenario in
Scenario Drop-down above"
        End
        End If
Dim i, j, n As Integer
Dim Traffic1 As Double
n = Worksheets("PDashboard").Cells(9, 4)
Traffic1 = Worksheets("PDashboard").Cells(10, 4)
Worksheets("PSimulation").Range("a:bl").Clear
Worksheets("PSimulation").Cells(3, 1) = "No."
Worksheets("PSimulation").Cells(3, 2) = "NPV ($ mn)"
Worksheets("PSimulation").Cells(3, 3) = "IRR"
Worksheets("PSimulation").Cells(3, 4) = "Payback period (years)"
For i = 1 To n
For j = 1 To 60
```

Cont’d…

```
Worksheets("PSimulation").Cells(3, j + 4) = "Traffic" & j

Worksheets("PSimulation").Cells(i + 3, 1) = i

Worksheets("PSimulation").Cells(i + 3, 5) = Traffic1

g = 2 / 100 + Application.WorksheetFunction.RandBetween(-100, 100) / 100 * 1 / 100

Worksheets("PSimulation").Cells(i + 3, j + 5) =
Application.WorksheetFunction.Min(Worksheets("PSimulation").Cells(i + 3, j + 4) * (1 + g),
Worksheets("PDetails").Cells(26, 4) * 1000000)

Worksheets("PDetails").Cells(52, j + 3) = Worksheets("PSimulation").Cells(i + 3, j + 4)

Next j

Calculate
```

Cont’d…

```
Worksheets("PSimulation").Cells(i + 3, 2) = Worksheets("PModel-M").Cells(31, 4)

Worksheets("PSimulation").Cells(i + 3, 3) = Worksheets("PModel-M").Cells(32, 4)

Worksheets("PSimulation").Cells(i + 3, 4) = Worksheets("PModel-M").Cells(33, 4)

Worksheets("PDashboard").Cells(11, 3) = i

Next i

Worksheets("PSimulation").Range("a:b").NumberFormat = "#,##0"

Worksheets("PSimulation").Range("d:bl").NumberFormat = "#,##0"

Worksheets("PSimulation").Range("c:c").NumberFormat = "0.0%"

Worksheets("PSimulation").Range("a:bl").HorizontalAlignment = xlCenter

Worksheets("PSimulation").Range("a:bl").VerticalAlignment = xlCenter

End Sub
```

Finalizing

- Macro will leave the last instance of simulation in the excel model
  - The output of XNPV, XIRR and payback period is corresponding to the last instance of simulation
- The last couple of commands in the macro are to change the format of the output reported on PSimulation sheet
- In Pdashboard:
  - Create a status %age
  - Create the status bar using REPT function
  - Go to PL&G, create the chart for NPV
    - Call MIN, MAX and calculate interval
    - Using interval set 10 different frequency bins and calculate the frequency in each bins
    - Introduce the matrix function FREQUENCY
      - You need to select the destination first and use Ctrl Shift Enter rather than Enter as the closing command
    - Create the NPV distribution chart and bring it on PDashboard
    - Calculate for how many instances NPV > 0

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Thank You!