CAPTUM CAPITAL
commercialising life science technology

A Generalised Model for Valuing Early Stage Technology

Palisade Europe User Conference
2008

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About Captum…

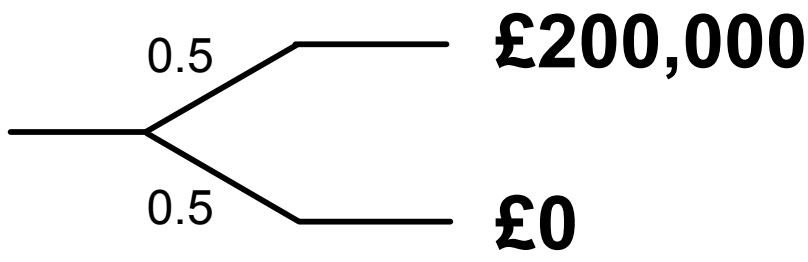
- Formed in 2004
- Transatlantic presence
- Specialised consulting to:
  - Private companies (pre-IPO)
  - Life science sector (Biotech, Med Dev, Pharma)
  - Business development, valuation, partnering
- MasterClasses in Finance, Leadership
  - Valuation Masterclass attended by over 350 executives in UK and Europe

Valuing Technology

- Technical Risk
  - Will it work?
  - Scale up issues
  - Regulatory hurdles
- Market Risk
  - Customer acceptance
  - Pricing issues
  - Competition

Valuing Risk

£ X ***or***



What value of "X" are you indifferent between a fixed sum and playing the game?

£1

£1,000

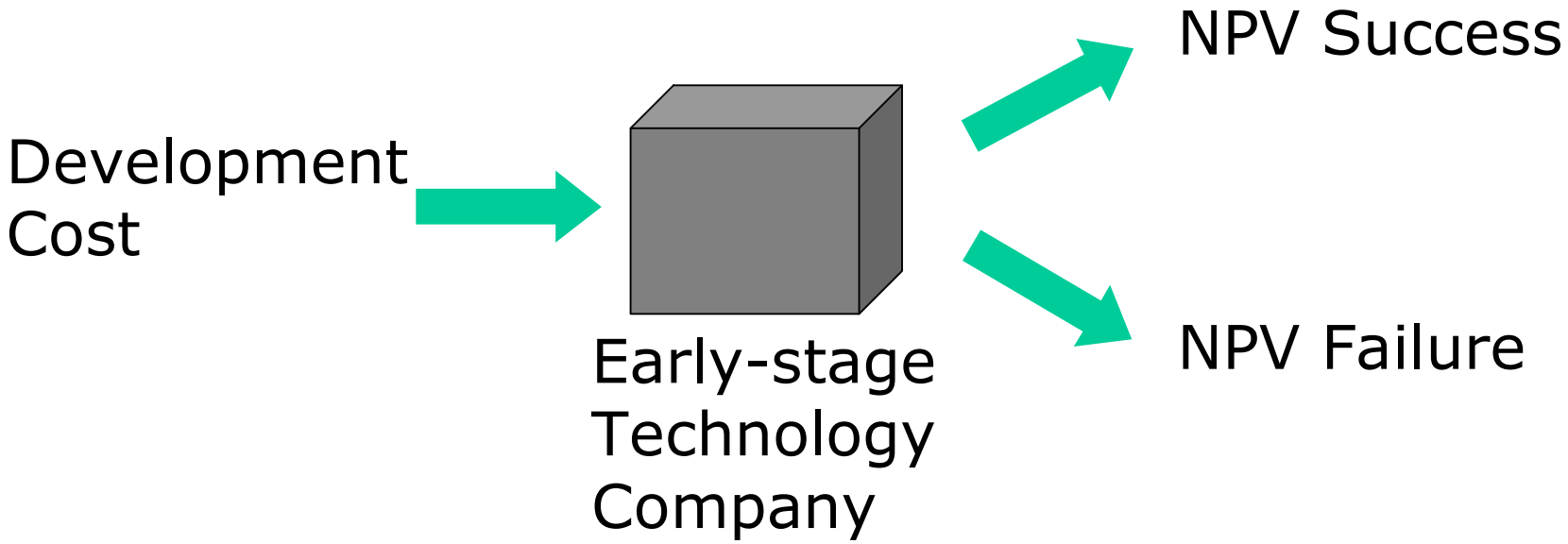
£10,000

£20,000

£50,000

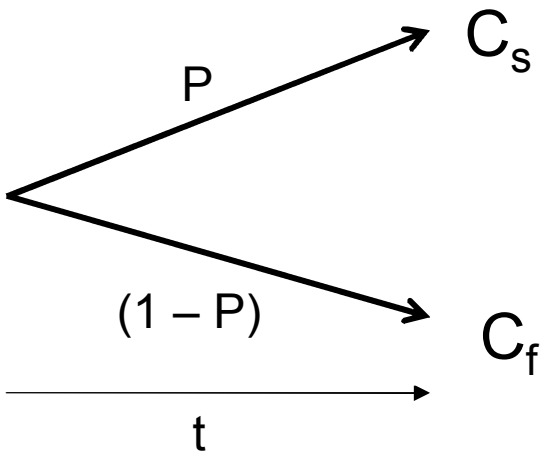
£100,000

Valuing Technology



Valuation Parameters

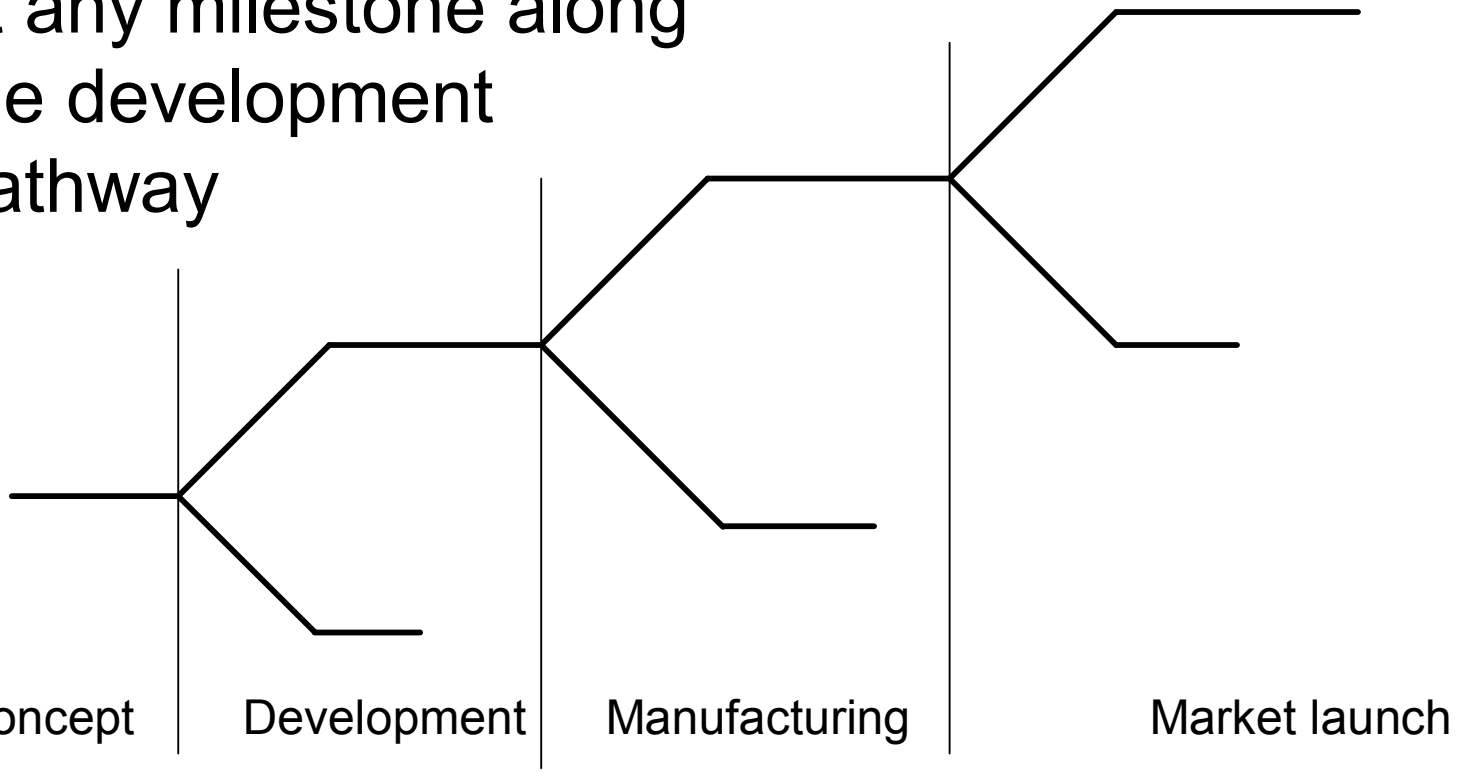
- Cash Flow
- Probability of achieving cash flow
- Discount rate (less uncertain)



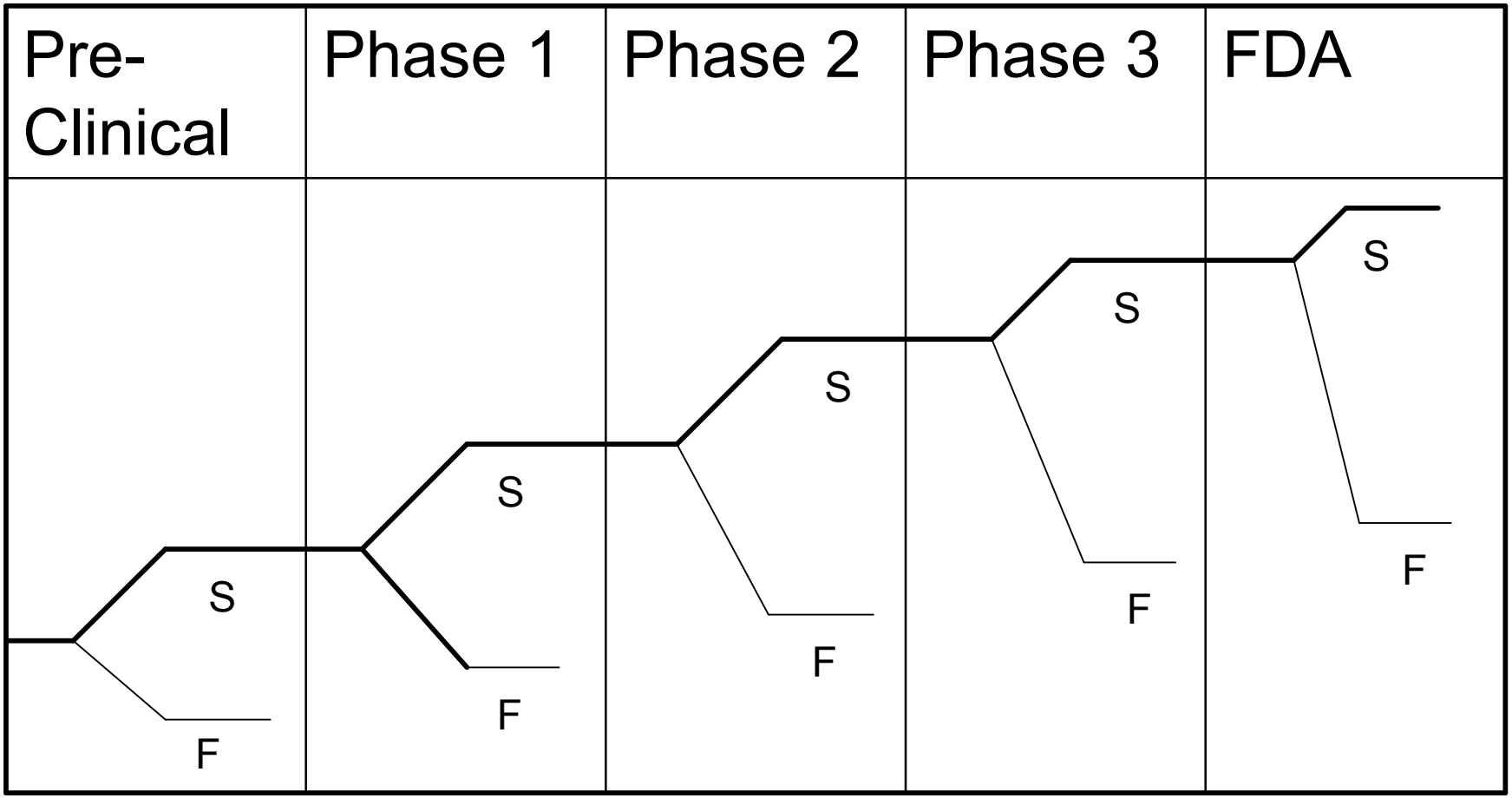
$$eNPV = \frac{PC_s}{(1+r)^t} + \frac{(1-P)C_f}{(1+r)^t}$$

Stepwise Development

Development can fail at any milestone along the development pathway



Drug Discovery Process



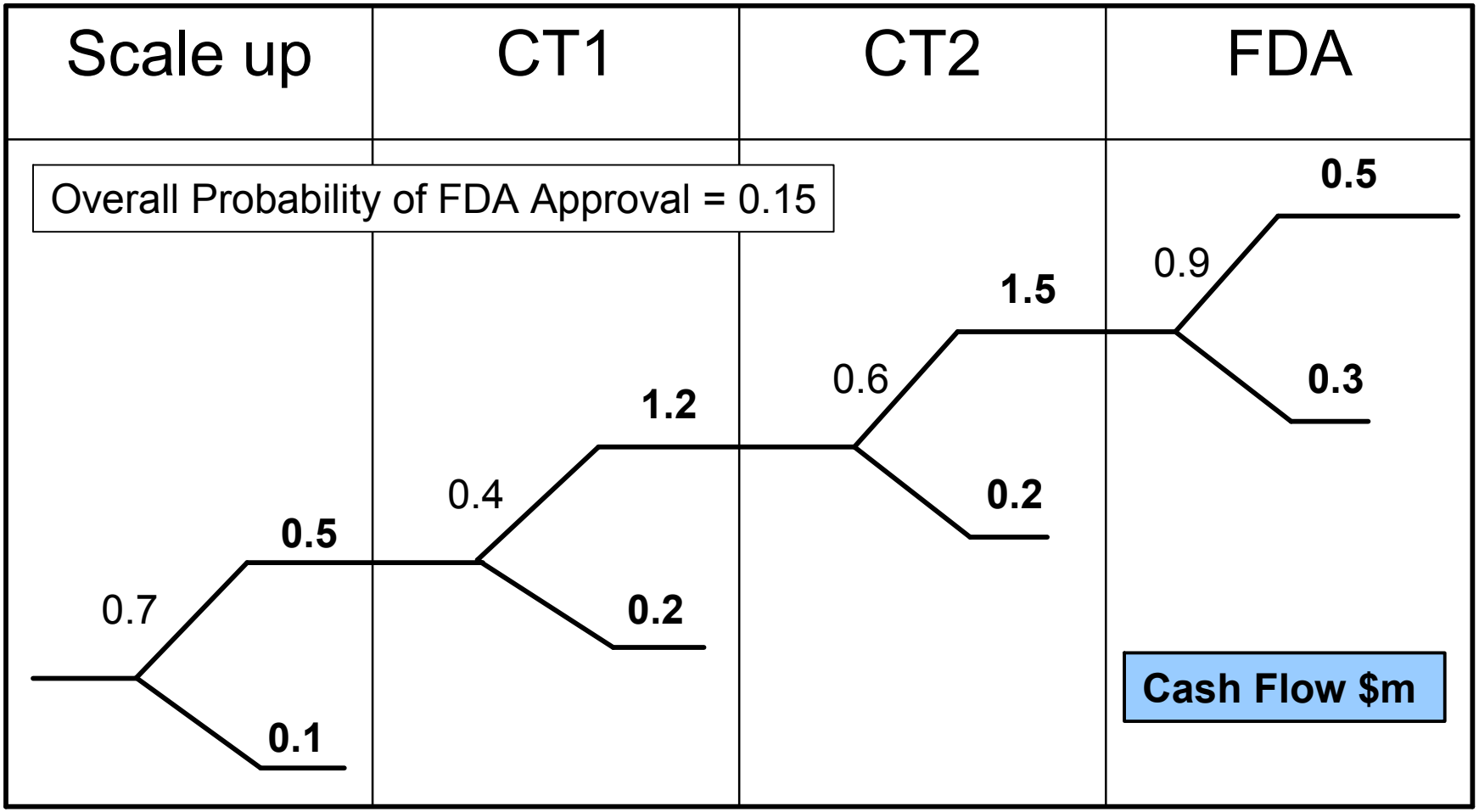
General Value Model

$$\text{Risk Adjusted NPV} = \left\{ \begin{array}{c} \text{Risk Adjusted NPV Development Cost} \\ + \\ \text{Risk Adjusted NPV Sales Income} \end{array} \right.$$

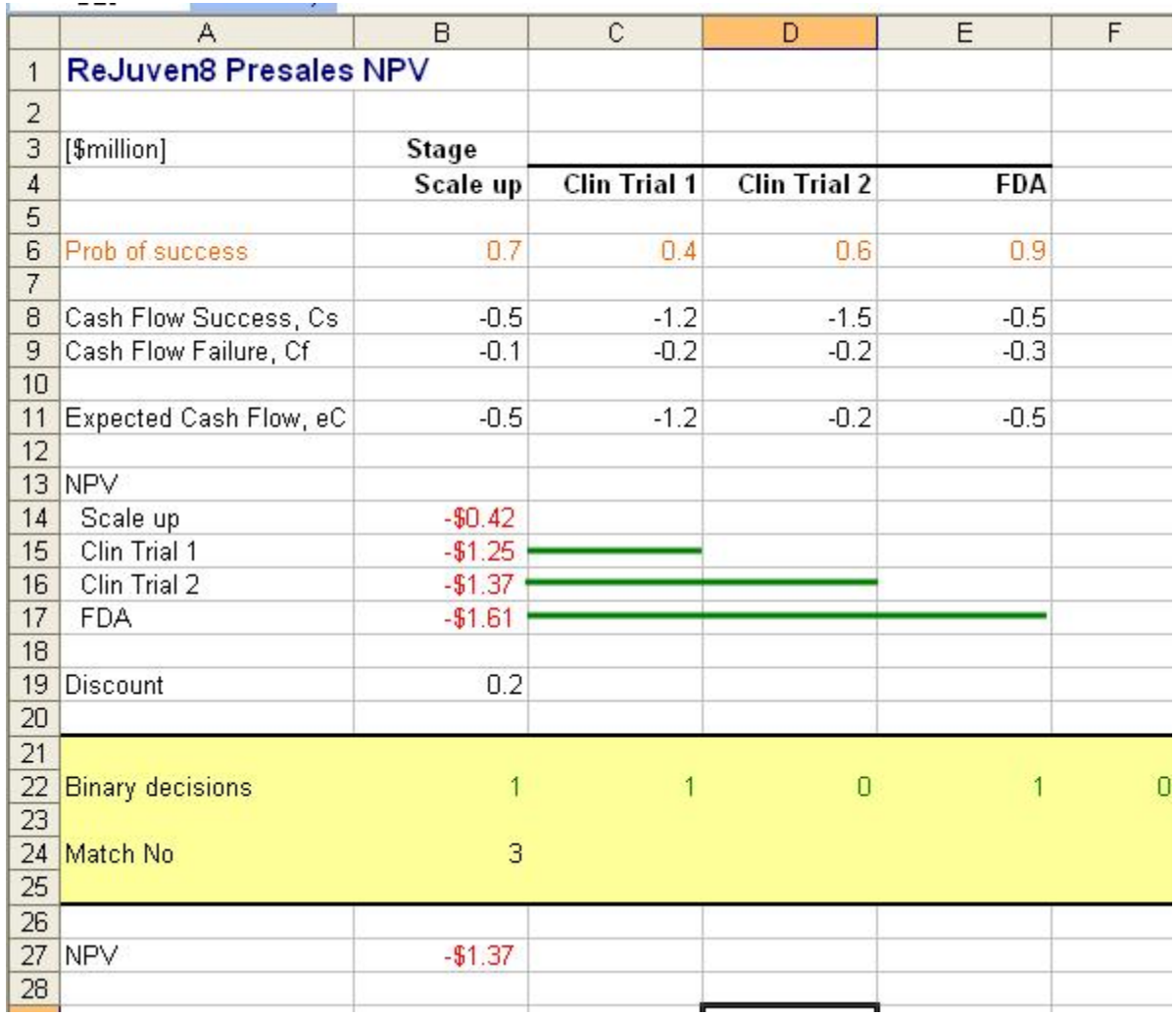
Case: ReJuven8

- Innovative wound care treatment
- Demonstrated on animals, limited human trial
- Requires manufacturing scale-up for:
  - Small and Large scale human clinical trials
  - FDA Approval
- Post FDA approval, sales launch

ReJuven8 Development

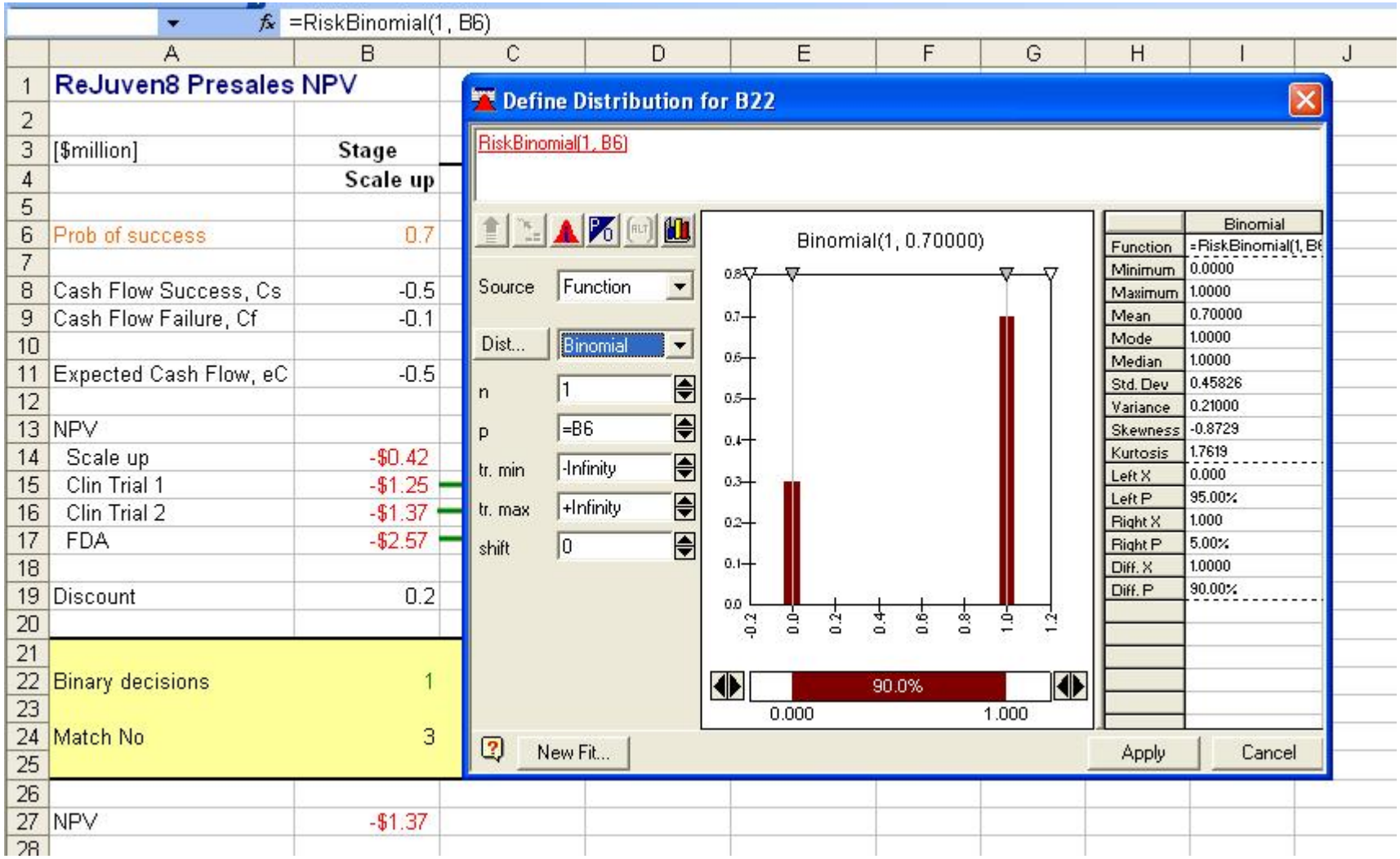


ReJuven8 PreSales Model

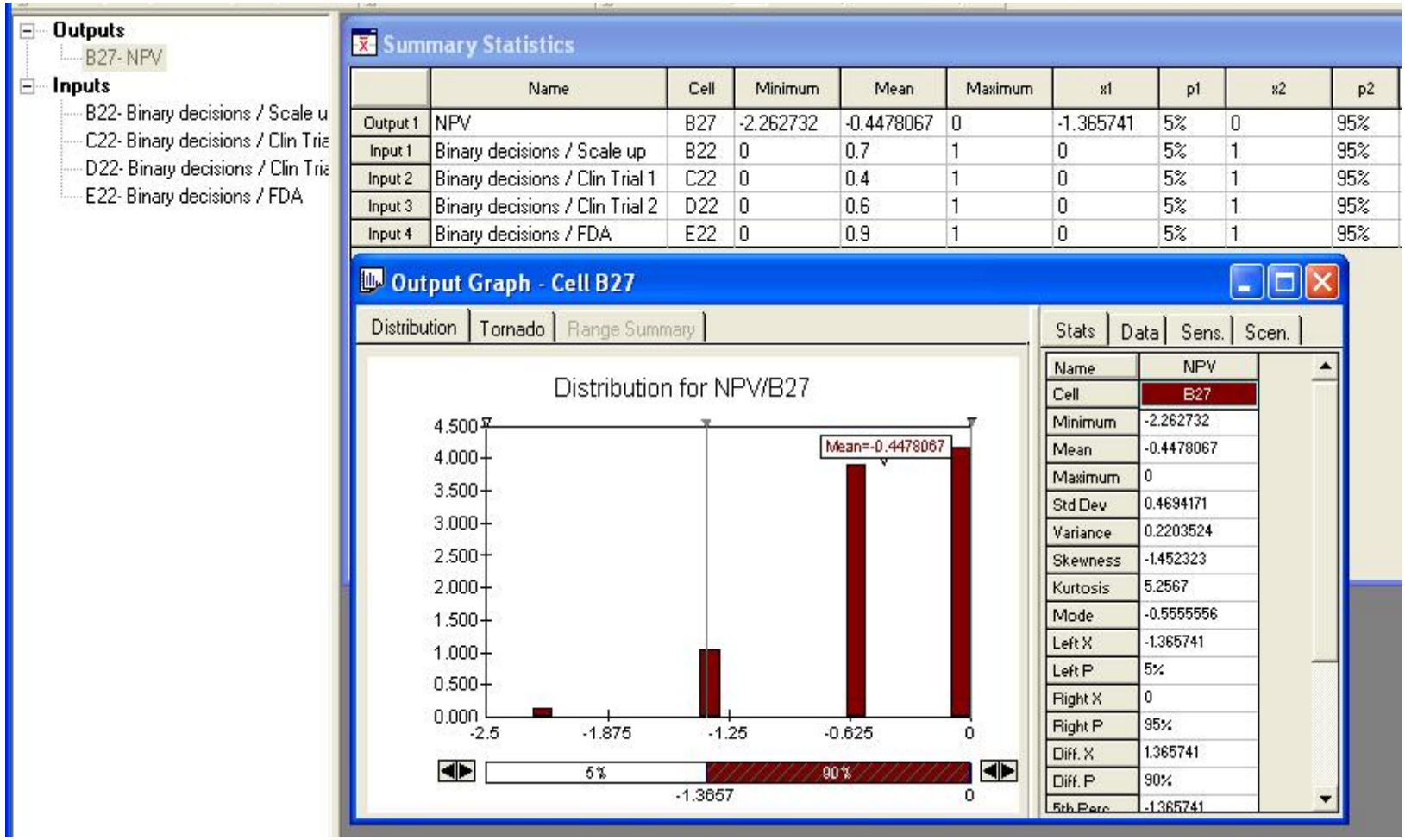


	A	B	C	D	E	F
1	**ReJuven8 Presales NPV**					
2						
3	[$million]	**Stage**				
4		**Scale up**	**Clin Trial 1**	**Clin Trial 2**	**FDA**	
5						
6	Prob of success	0.7	0.4	0.6	0.9	
7						
8	Cash Flow Success, Cs	-0.5	-1.2	-1.5	-0.5	
9	Cash Flow Failure, Cf	-0.1	-0.2	-0.2	-0.3	
10						
11	Expected Cash Flow, eC	-0.5	-1.2	-0.2	-0.5	
12						
13	NPV					
14	Scale up	-$0.42				
15	Clin Trial 1	-$1.25				
16	Clin Trial 2	-$1.37				
17	FDA	-$1.61				
18						
19	Discount	0.2				
20						
21						
22	Binary decisions	1	1	0	1	0
23						
24	Match No	3				
25						
26						
27	NPV	-$1.37				
28						

Binary Decisions



ReJuven8 Presales NPV



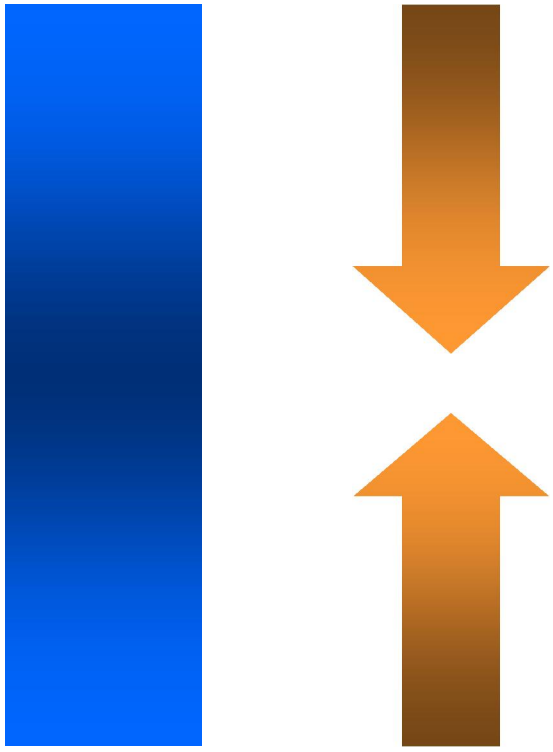
	Name	Cell	Minimum	Mean	Maximum	x1	p1	x2	p2
Output 1	NPV	B27	-2.262732	-0.4478067	0	-1.365741	5%	0	95%
Input 1	Binary decisions / Scale up	B22	0	0.7	1	0	5%	1	95%
Input 2	Binary decisions / Clin Trial 1	C22	0	0.4	1	0	5%	1	95%
Input 3	Binary decisions / Clin Trial 2	D22	0	0.6	1	0	5%	1	95%
Input 4	Binary decisions / FDA	E22	0	0.9	1	0	5%	1	95%

Name	NPV
Cell	B27
Minimum	-2.262732
Mean	-0.4478067
Maximum	0
Std Dev	0.4694171
Variance	0.2203524
Skewness	-1.452323
Kurtosis	5.2567
Mode	-0.5555556
Left X	-1.365741
Left P	5%
Right X	0
Right P	95%
Diff. X	1.365741
Diff. P	90%
5th Perc	-1.365741

Forecasting Sales

Top Down

Sales



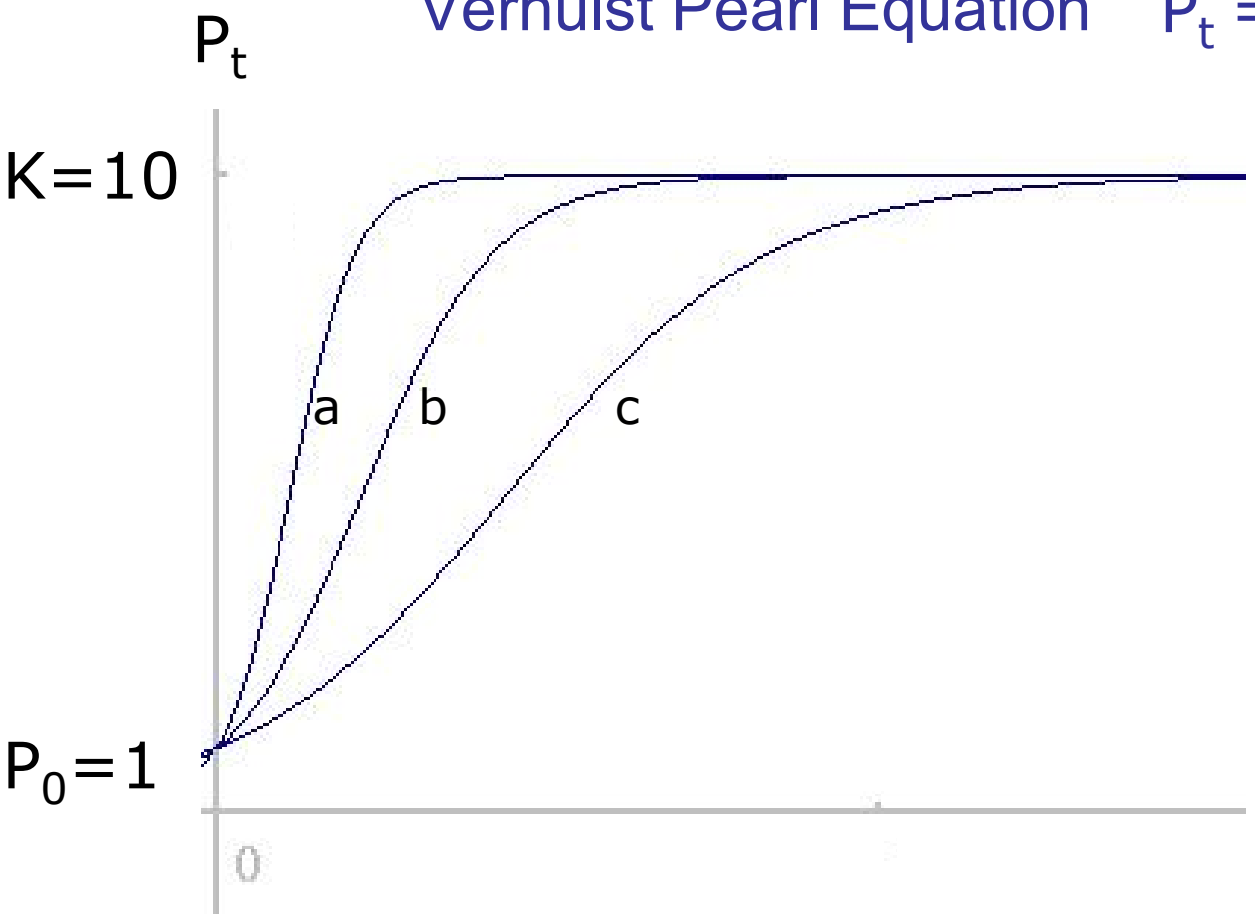
- Total Market Size ($/yr)
- Market Share (%)

- Price/unit ($/unit)
- User Penetration (%)
- Potential Users (units)

Bottom Up

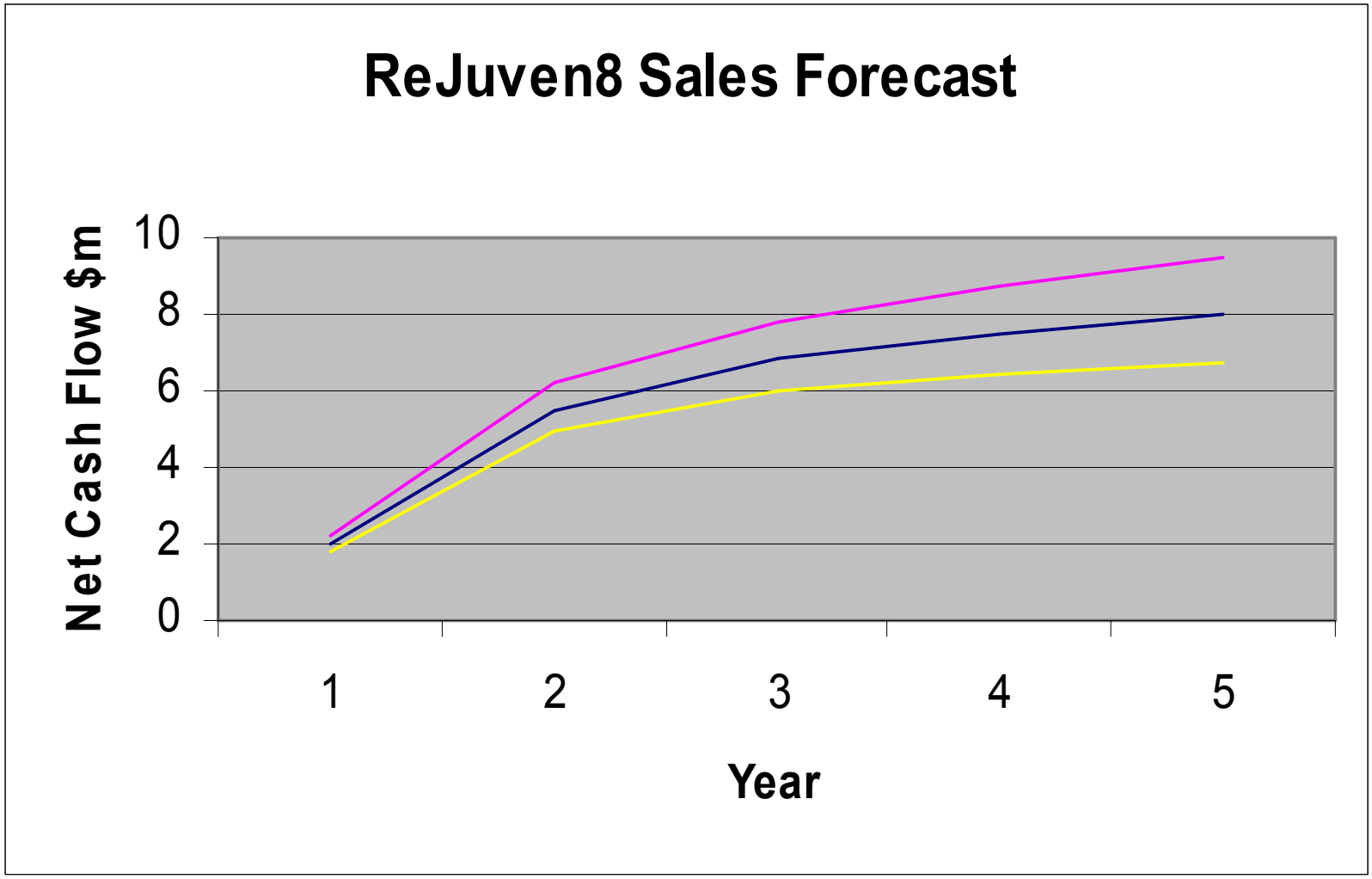
Market Penetration

Verhulst Pearl Equation $P_t = \frac{K P_o e^{kt}}{K + P_o (e^{kt} - 1)}$



	k
a =	2
b =	1
c =	0.5

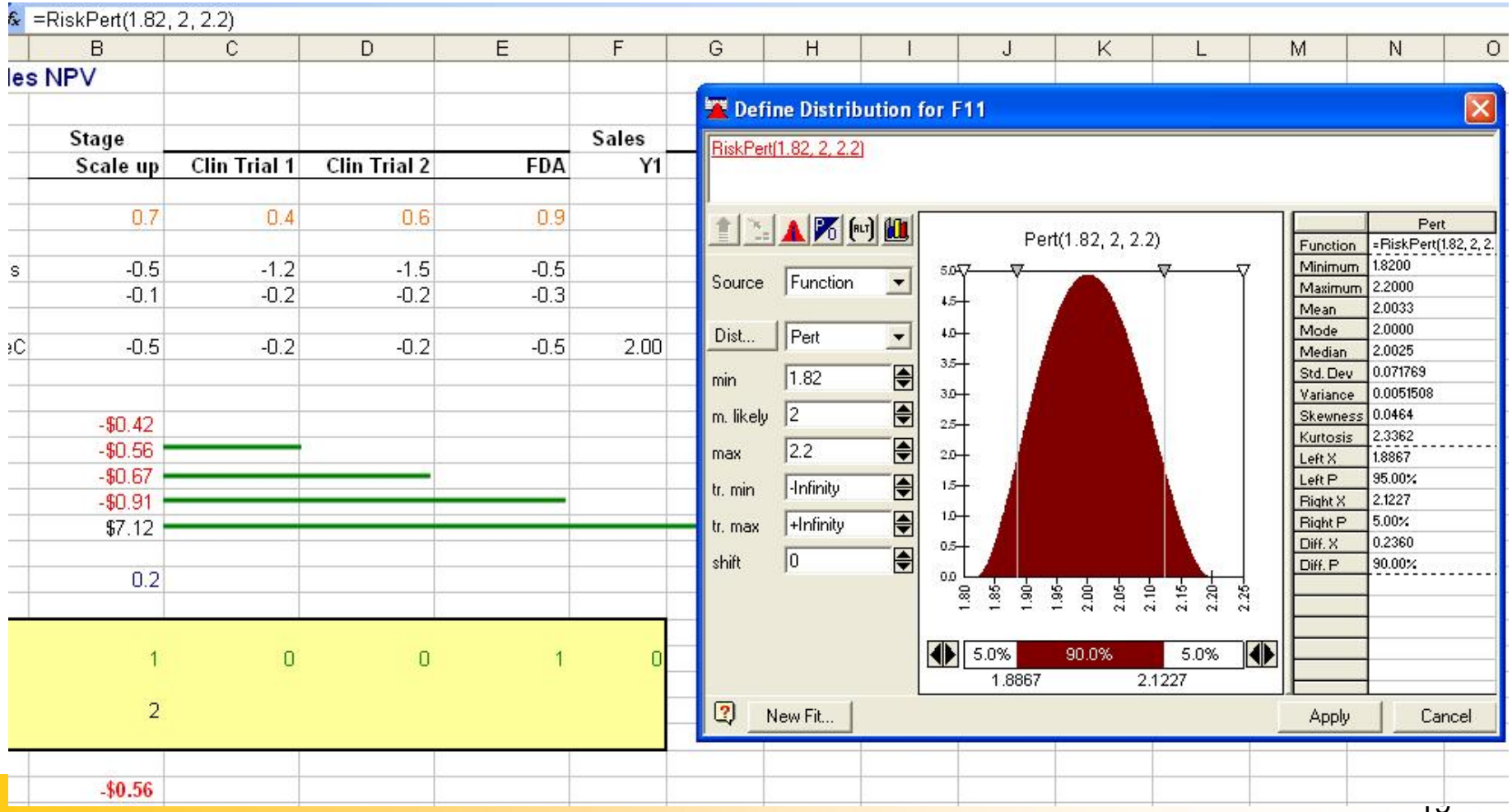
Adding Post Launch Sales



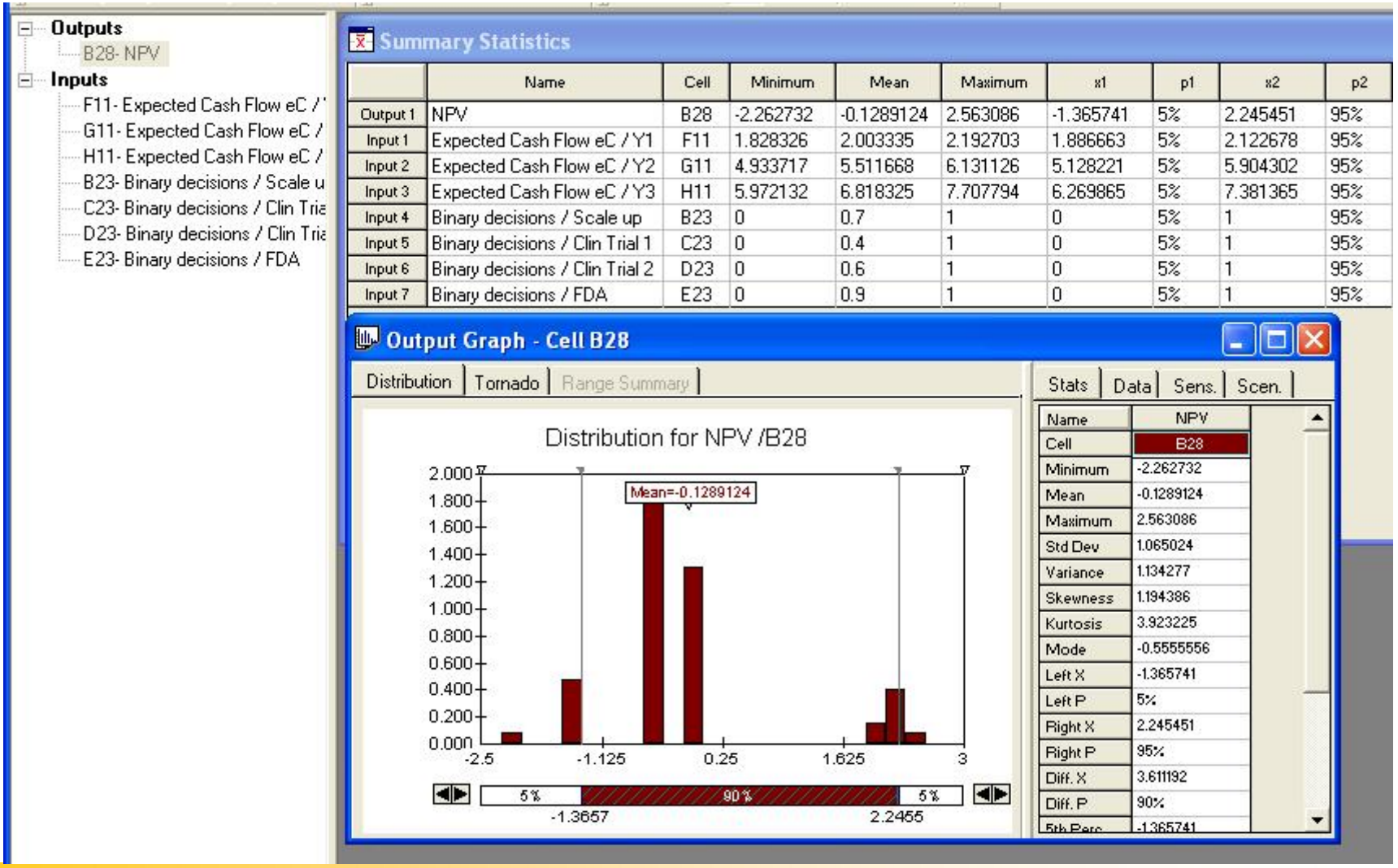
ReJuven8 Post Sales NPV

	A	B	C	D	E	F	G	H	I	J
1	**ReJuven8 NPV**									
2										
3	[$million]	**Stage**				**Sales**				
4		**Scale up**	**Clin Trial 1**	**Clin Trial 2**	**FDA**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**
5										
6	Prob of success	0.7	0.4	0.6	0.9					
7										
8	Cash Flow Success Cs	-0.5	-1.2	-1.5	-0.5					
9	Cash Flow Failure Cf	-0.1	-0.2	-0.2	-0.3					
10										
11	Expected Cash Flow eC	-0.5	-0.2	-1.5	-0.5	2.11	5.63	6.79	7.86	7.33
12										
13	NPV									
14	Scale up	-$0.42								
15	Clin Trial 1	-$0.56								
16	Clin Trial 2	-$1.42								
17	FDA	-$1.66								
18	Sales	$6.21								
19										
20	Discount, r	0.2								
21										
22										
23	Binary decisions	1	0	1	1	0				
24										
25	Match No	2								
26										
27										
28	**NPV**	**-$0.56**								

Year 1 Sales Distribution



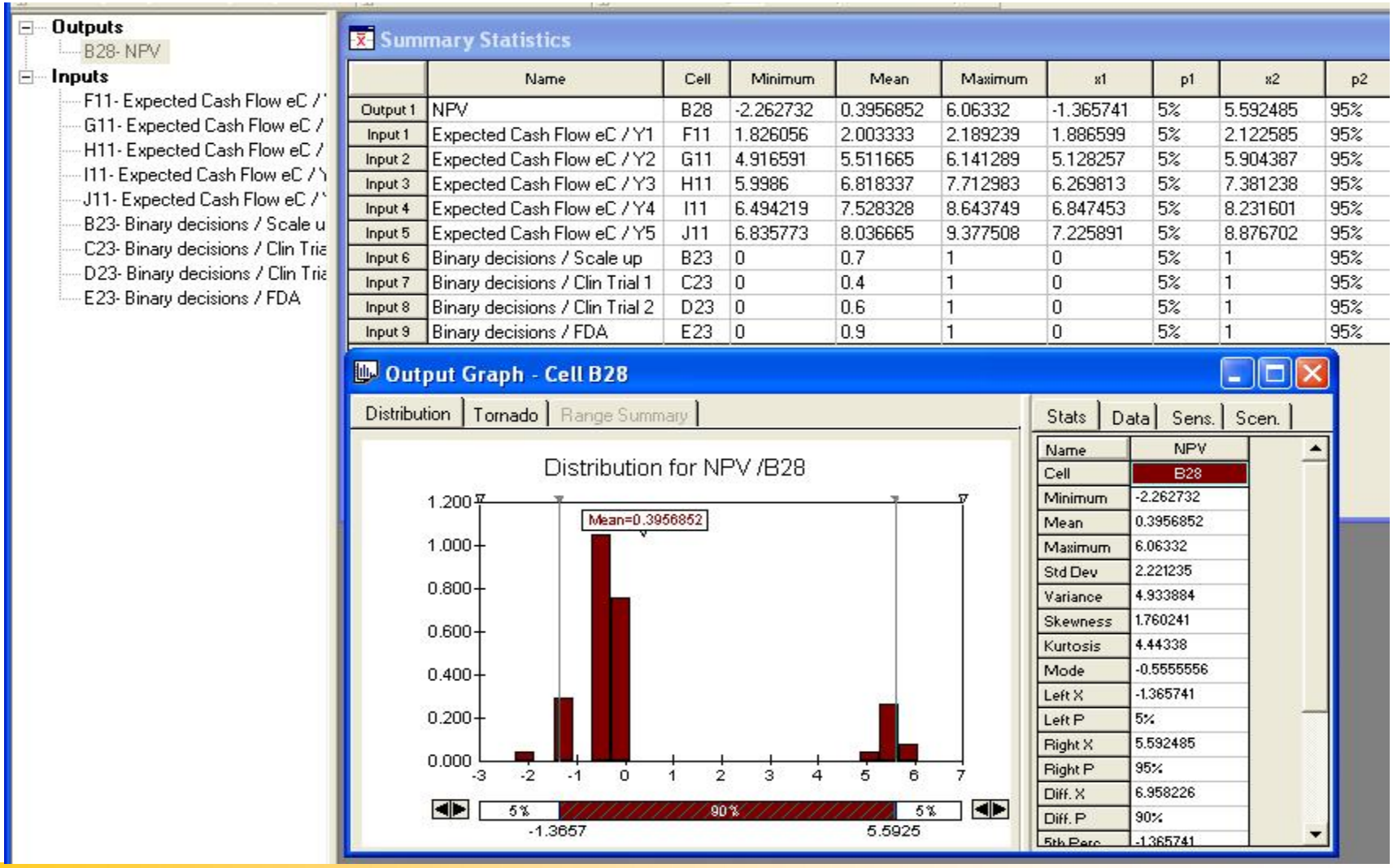
ReJuven8 3 Year Sales



	Name	Cell	Minimum	Mean	Maximum	x1	p1	x2	p2
Output 1	NPV	B28	-2.262732	-0.1289124	2.563086	-1.365741	5%	2.245451	95%
Input 1	Expected Cash Flow eC / Y1	F11	1.828326	2.003335	2.192703	1.886663	5%	2.122678	95%
Input 2	Expected Cash Flow eC / Y2	G11	4.933717	5.511668	6.131126	5.128221	5%	5.904302	95%
Input 3	Expected Cash Flow eC / Y3	H11	5.972132	6.818325	7.707794	6.269865	5%	7.381365	95%
Input 4	Binary decisions / Scale up	B23	0	0.7	1	0	5%	1	95%
Input 5	Binary decisions / Clin Trial 1	C23	0	0.4	1	0	5%	1	95%
Input 6	Binary decisions / Clin Trial 2	D23	0	0.6	1	0	5%	1	95%
Input 7	Binary decisions / FDA	E23	0	0.9	1	0	5%	1	95%

Name	NPV
Cell	B28
Minimum	-2.262732
Mean	-0.1289124
Maximum	2.563086
Std Dev	1.065024
Variance	1.134277
Skewness	1.194386
Kurtosis	3.923225
Mode	-0.5555556
Left X	-1.365741
Left P	5%
Right X	2.245451
Right P	95%
Diff. X	3.611192
Diff. P	90%
5th Perc	-1.365741

ReJuven8 5 Year Sales



	Name	Cell	Minimum	Mean	Maximum	x1	p1	x2	p2
Output 1	NPV	B28	-2.262732	0.3956852	6.06332	-1.365741	5%	5.592485	95%
Input 1	Expected Cash Flow eC / Y1	F11	1.826056	2.003333	2.189239	1.886599	5%	2.122585	95%
Input 2	Expected Cash Flow eC / Y2	G11	4.916591	5.511665	6.141289	5.128257	5%	5.904387	95%
Input 3	Expected Cash Flow eC / Y3	H11	5.9986	6.818337	7.712983	6.269813	5%	7.381238	95%
Input 4	Expected Cash Flow eC / Y4	I11	6.494219	7.528328	8.643749	6.847453	5%	8.231601	95%
Input 5	Expected Cash Flow eC / Y5	J11	6.835773	8.036665	9.377508	7.225891	5%	8.876702	95%
Input 6	Binary decisions / Scale up	B23	0	0.7	1	0	5%	1	95%
Input 7	Binary decisions / Clin Trial 1	C23	0	0.4	1	0	5%	1	95%
Input 8	Binary decisions / Clin Trial 2	D23	0	0.6	1	0	5%	1	95%
Input 9	Binary decisions / FDA	E23	0	0.9	1	0	5%	1	95%

Summary

- **Model Advantages**
  - Graphical depiction of technology/market risk
  - Flexible: facilitates development strategy
  - Intuitive: based on realistic probabilities
  - Effective communication tool
- **Downside**
  - Valuing very early stage technology difficult
  - Most investors are risk adverse (<eNPV)
  - Requires analytical discipline

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