Webmaster.com, Inc. Capital Budgeting Cash Flow Estimate Exercise

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Request Excel Spreadsheet from this presentation at above email address

Disciplines of Interest: Cases, Case Methods or Experiential Learning

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Abstract

This case involves developing an excel model to determine the value of various configurations of a new manufacturing line for an imaginary computer hardware provider, Webmaster.com, Inc. Specifics are provided for the student to estimate cash flows associated with projects over its' projected economic life. Once the value of the project is developed using the original data the student is asked to consider several other aspects which commonly occur in the valuation of capital budgeting projects. These issues include conducting a sensitivity analysis for price, units sold and variable costs, the estimation of the minimum acceptable price for the output of the project, the analysis of a premium addition option to the original equipment profile of the project and the estimation of the valuation effects of a catastrophic failure of the project. The learning objectives of this exercise will allow the successful student to: Explain the term free cash flow (FCF), Explain the term incremental cash flow and identify the incremental cash flows associated with a given project, Properly account for depreciation in an FCF estimation, Compute net operating working capital (NOWC) and properly account for it in an FCF estimation, Adjust FCF estimation to account for inflation and Explain and identify externalities and properly account for them in an FCF analysis.

The Case:

Webmasters.com has developed a powerful new server that would be used for corporations' Internet activities. It would cost $47million at Year 0 to buy the equipment necessary to manufacture the server. The project would require net working capital at the beginning of each year in an amount equal to 9% of the year's projected sales changes; for example, $NWC_0 = 9\%(Sales_1-Sales_0)$. The servers would sell for $27,500 per unit, and Webmasters believes that variable costs would amount to $19,500 per unit. After Year 1, the sales price and variable costs will increase at the inflation rate of 3%. The company's non-variable costs would be $1.75 million at Year 1 and would increase with inflation.

The server project would have a life of 15 years. If the project is undertaken, it must be continued for the entire 15 years. Also, the project's returns are expected to be highly correlated with returns on the firm's other assets. The firm believes it could sell 1,000 units per year.

The equipment would be depreciated using a 5-year class project over 6 years, using MACRS rates (20%, 32%, 19%,12%,12% and 5%) over the six years that depreciation will be taken. The estimated market value of the equipment at the end of the project's 15-year life is $200,000. Webmaster has estimated that the environmental shutdown costs related to shutdown would be $5,200,000. Webmasters' federal-plus-state tax rate is 24%. Its cost of capital is 11% for average-risk projects.

Your group is to approach the issues of this problem from the prospective of a consulting group to Webmaster. Develop a spreadsheet model, and use it to find the project's NPV, IRR, and MIRR. What are your recommendations to Webmaster? These finding and recommendations are to be included in an academic quality paper 6-10 pages in length (12pt. font, double spaced).

Now conduct a sensitivity analysis to determine the sensitivity of NPV to changes in the sales price, variable costs per unit and the number of units sold. Set these variables' values at 1% ,2%, 3% and 4% above and below their base-case values. Include a graph in your analysis. How does this analysis affect your recommendations to Webmaster? What are the ramifications of Webmaster vastly underestimating their competition in the original spreadsheet? Be sure to talk about the variables affected by this underestimation of competition.

Webmaster is also interested in determining the minimum price that could be charged for their servers (current price is $27,500) and produce a non-negative NPV. Please provide them with this price. What happens to your NPV results if the project is viewed as more risky that the average project? Less risky? How would you operationalize these complications in your work? Show the effects of either an increase in risk or a decrease in risk in a separate worksheet.

Webmaster has an option to purchase a premium addition to the original machinery. This addition costs an additional $750,000 and has been shown in the past to reduce COGS by 3% per year. Should Webmaster purchase this premium addition? Show the data to support your answer.

Finally, suppose Webmaster opted for the premium addition. The project works as predicted for ten years and then catastrophically fails (i.e., economic life is 10 years). There is no salvage value and shutdown costs increase to $5.5 million. What happens to the value of the project? Show this in another worksheet.

Please make sure that your assumptions, recommendations, and your answers to all questions appear in the paper so that Webmaster can quickly and easily access the results of your work.

Suggested Solutions:

The spreadsheet in Table 1 presents a proposed solution for the base problem shown above. The students can be instructed on several of the base topics to solve this problem. They include the following:

- Discussion of Free Cash Flow (FCF), FCF is a translation of the Income Statement (Accounting language). This "translation" involves discussion of net working capital associated with the project and how these values are estimated and more importantly why they are estimated. The discussion leads to a final estimation of project cash flows equal to NOPAT + Depreciation + change in NWC
- Detailed analysis of depreciation. Depreciation is a non-cash charge that effects cash flows because it affects taxes in a particular period.
- Taxes, if EBIT are negative, it is assumed that the firm can take advantage of the loss to reduce taxable income in the firm's other areas in the period. This means that taxes associated with the project will be positive in the years where EBIT are negative.
- Economic life of the project.
- The application of Environmental shutdown costs and Salvage value in the N+1 period.
- The adjustment of Cashflows for inflation.

The solution provided shows that the NPV is negative ($1,443,662) and that the project in its present state should be rejected by the firm.

Sensitivity Analysis:

Sensitivity Analysis (SA) is conducted by developing data tables which measure the NPV of the project as selected variables change in 1% increments from their original values. The variables selected to change are Units sold, Price of product and Variable Cost per unit. The data table set up and results are found in Table 2 and shown graphically in Chart 1. The results indicate that the NPV of the project is most

sensitive to changes in Price. A one percent increase in the Price generates a 120.45% increase in the NPV.

Finding Minimum Price:

Table 3 shows the results of finding the minimum acceptable price. This price will generate a NPV for the project of zero. This calculation is accomplished using Solver. The minimum acceptable price in this instance is $27,728. The original price, recall is $27,500, thus the minimum price is only 0.83% higher. This could generate discussion of the firm's market power. Does the firm have the ability to raise the price by less than one percent without losing customers?

Deluxe Addition:

Table 4 presents a suggested solution to the question should the firm take on the premium addition to the production line machinery. In this scenario the premium addition has a cost of $750,000 and produces an expected reduction in COGS of 3 percent. This solution increases cost of project by $750,000 to a total of $47,750,000.. This increase causes an increase in depreciation values which would be expected to increase the value of the project. However, the major benefit of accepting the premium addition is to reduce COGS by 3 percent. This is accomplished by multiplying the COGS values from the previous model by .97=(1-.03). The results indicate that the premium addition should be accepted as the NPV of the project is now positive (+$1,690,242). The discussion can extend to emphasize the firm's need to control COGS and the effects this variable can have on the value of the entire project.

Catastrophic Failure:

Table 5 present the results of the Catastrophic failure scenario. Production cash flows are abruptly terminated after 10 periods and a larger shutdown cost is absorbed by the firm in period 11. The solution is presented from time period zero perspective and shows that the failure dramatically affects value of the project. NPV is now -$8,007,429. This discussion can be used to highlight the effects on value of either natural or man-made actions. This conversation can also be expanded to real options and other types of safeguards that can be added at a price to mitigate some of the dramatic negative value effects.

References

Brigham, E.F., Ehrhardt, M.C. (2022).Financial Management: Theory & Practice (esp. Chapter 11). Boston, MA:Cengage Learning.

Ross, S. A., Westerfield, R., & Jordan, B. D. (2016). Fundamentals of corporate finance (pp. 353-354). New York, NY: McGraw Hill/Irwin.

Table 1: NPV analysis original setup

Net Present Value Example																			
Standard "single bullet" estimates																			
			Cost of capital=			0.11													
Cost of Project:			Inflation rate=			0.03													
i. machinery	$47,000,000		Tax rate=			0.24													
			Salvage Value=		$ 200,000	in real $													
			Sales =		1000	in 2024													
Total	$47,000,000		Price =		$ 27,500	in real $													
			Variable cost		$ 19,500	in 2024													
		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	Capital Expenditures	(47,000,000)																	
	Salvage																	200,000	
	Environmental shutdown																	(5,200,000)	
	Revenues		27,500,000	28,325,000	29,174,750	30,049,993	30,951,492	31,880,037	32,836,438	33,821,531	34,836,177	35,881,263	36,957,700	38,066,431	39,208,424	40,384,677	41,596,217		
	COGS		(19,500,000)	(20,085,000)	(20,687,550)	(21,308,177)	(21,947,422)	(22,605,844)	(23,284,020)	(23,982,540)	(24,702,017)	(25,443,077)	(26,206,369)	(26,992,560)	(27,802,337)	(28,636,407)	(29,495,500)		
	Incremental Costs(SGA)		(1,750,000)	(1,802,500)	(1,856,575)	(1,912,272)	(1,969,640)	(2,028,730)	(2,089,592)	(2,152,279)	(2,216,848)	(2,283,353)	(2,351,854)	(2,422,409)	(2,495,082)	(2,569,934)	(2,647,032)		
	Depreciation		(9,400,000)	(15,040,000)	(8,930,000)	(5,640,000)	(5,640,000)	(2,350,000)											
	Taxes		756,000	2,064,600	551,850	(285,491)	(334,663)	(1,174,911)	(1,791,078)	(1,844,811)	(1,900,155)	(1,957,160)	(2,015,875)	(2,076,351)	(2,138,641)	(2,202,801)	(2,268,885)	1,200,000	
	NOPAT		(2,394,000)	(6,537,900)	(1,747,525)	904,053	1,059,767	3,720,552	5,671,748	5,841,901	6,017,158	6,197,673	6,383,603	6,575,111	6,772,364	6,975,535	7,184,801	(3,800,000)	
	Net Operating Cashflows	(47,000,000)	7,006,000	8,502,100	7,182,475	6,544,053	6,699,767	6,070,552	5,671,748	5,841,901	6,017,158	6,197,673	6,383,603	6,575,111	6,772,364	6,975,535	7,184,801	(3,800,000)	
	Changes in WC																		
	[Rec - Pay]	(2,475,000)	(74,250)	(76,478)	(78,772)	(81,135)	(83,569)	(86,076)	(88,658)	(91,318)	(94,058)	(96,879)	(99,786)	(102,779)	(105,863)	(109,039)	3,743,660	-	
	Net Cash flows	(49,475,000)	6,931,750	8,425,623	7,103,703	6,462,918	6,616,198	5,984,476	5,583,090	5,750,583	5,923,100	6,100,793	6,283,817	6,472,332	6,666,501	6,866,497	10,928,461	(3,800,000)	
	Net Present Value=	(1,443,662)																	
	IRR	10.45%																	
	MIRR	10.80%																	
	Working Capital:																		
		[NWOC](t) = 0.09*[Revenue(t)-Revenue(t-1)]			0.09														
	Incremental Costs:	$1,750,000																	
	ACRS:	(0.2,0.32,0.19,0.12,0.12,and 0.05), in years 1 through 6 respectively.																	
		0.2	0.32	0.19	0.12	0.12	0.05												

Table 2: NPV Sensitivity Analysis

Sensitivity of NPV Units sold				Sensitivity of NPV Price				Sensitivity of NPV Variable Costs			
Change in Units	Units Sold	NPV	Change in NPV	Change in Price	Price	NPV	Change in NPV	Change in VC	VC	NPV	Change in NPV
		(1,443,662)				(1,443,662)				(1,443,662)	
-4.00%	960	(3,401,971)	-135.65%	-4.00%	$26,400.00	(8,399,112)	-481.79%	-4.00%	18,720	3,553,480	346.14%
-3.00%	970	(2,912,394)	-101.74%	-3.00%	$26,675.00	(6,660,250)	-361.34%	-3.00%	18,915	2,304,194	259.61%
-2.00%	980	(2,422,816)	-67.82%	-2.00%	$26,950.00	(4,921,387)	-240.90%	-2.00%	19,110	1,054,909	173.07%
-1.00%	990	(1,933,239)	-33.91%	-1.00%	$27,225.00	(3,182,524)	-120.45%	-1.00%	19,305	(194,376)	86.54%
0.00%	**1000**	**(1,443,662)**	0.00%	**0.00%**	**$27,500.00**	**(1,443,662)**	0.00%	0.00%	**19,500**	**(1,443,662)**	0.00%
1.00%	1010	(954,084)	33.91%	1.00%	$27,775.00	295,201	120.45%	1.00%	19,695	(2,692,947)	-86.54%
2.00%	1020	(464,507)	67.82%	2.00%	$28,050.00	2,034,064	240.90%	2.00%	19,890	(3,942,232)	-173.07%
3.00%	1030	25,071	101.74%	3.00%	$28,325.00	3,772,926	361.34%	3.00%	20,085	(5,191,518)	-259.61%
4.00%	1040	514,648	135.65%	4.00%	$28,600.00	5,511,789	481.79%	4.00%	20,280	(6,440,803)	-346.14%

Chart 1: NPV Sensitivity Analysis

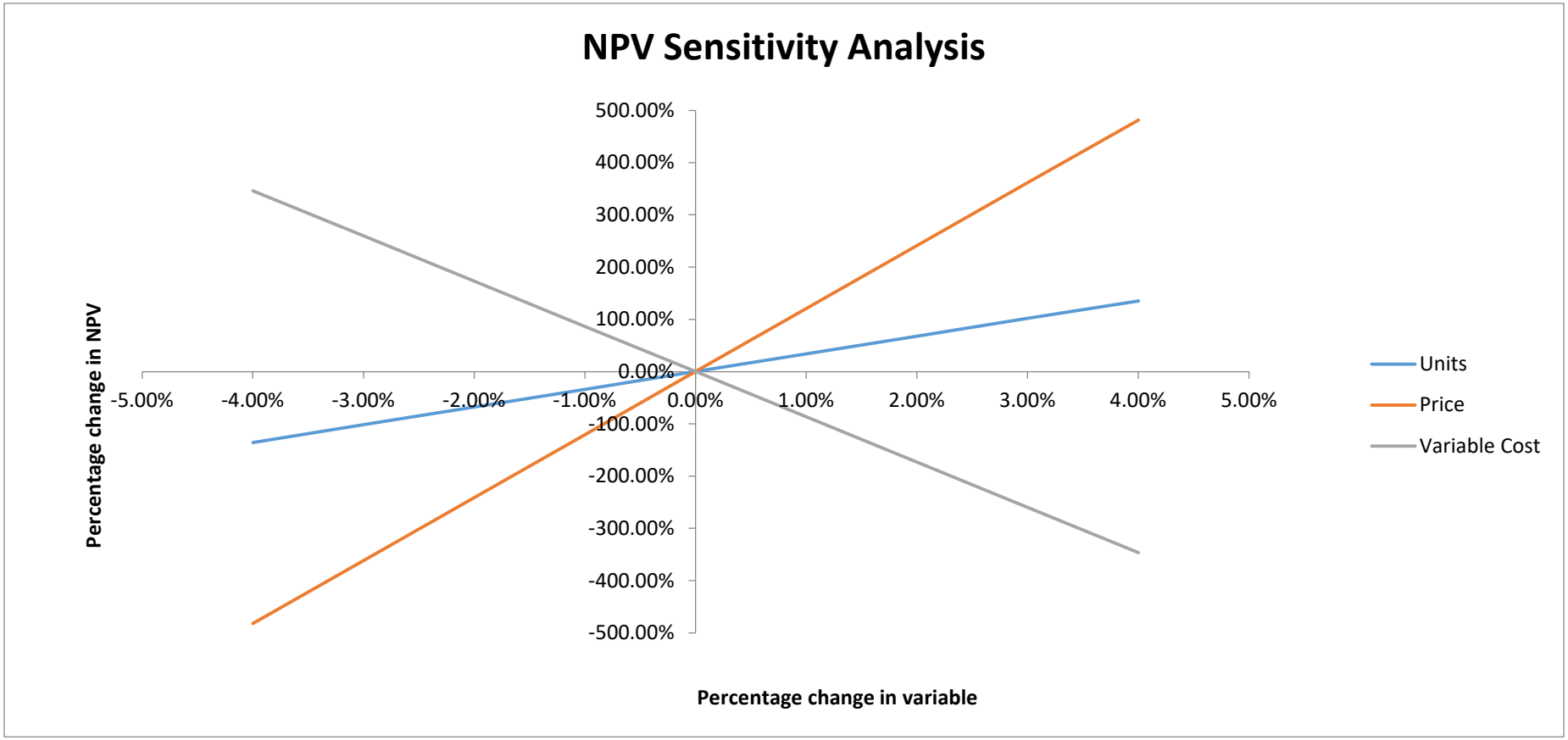

Table 3:Using Solver to find Minimum Acceptable Price

Net Present Value Example																		
Standard "single bullet" estimates																		
			Cost of capital=			0.11												
Cost of Project:			Inflation rate=			0.03												
i. machinery	$47,000,000		Tax rate=			0.24												
			Salvage Value=		$ 200,000	in real $												
			Sales =		1000	in 2024												
Total	$47,000,000		Price =		$ 27,728	in real $												
			Variable cost		$ 19,500	in 2024												
		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Capital Expenditures	(47,000,000)																
	Salvage																	200,000
	Environmental shutdown																	(5,200,000)
	Revenues		27,728,314	28,560,164	29,416,968	30,299,478	31,208,462	32,144,716	33,109,057	34,102,329	35,125,399	36,179,161	37,264,536	38,382,472	39,533,946	40,719,964	41,941,563	
	COGS		(19,500,000)	(20,085,000)	(20,687,550)	(21,308,177)	(21,947,422)	(22,605,844)	(23,284,020)	(23,982,540)	(24,702,017)	(25,443,077)	(26,206,369)	(26,992,560)	(27,802,337)	(28,636,407)	(29,495,500)	
	Incremental Costs(SGA)		(1,750,000)	(1,802,500)	(1,856,575)	(1,912,272)	(1,969,640)	(2,028,730)	(2,089,592)	(2,152,279)	(2,216,848)	(2,283,353)	(2,351,854)	(2,422,409)	(2,495,082)	(2,569,934)	(2,647,032)	
	Depreciation		(9,400,000)	(15,040,000)	(8,930,000)	(5,640,000)	(5,640,000)	(2,350,000)										
	Taxes		701,205	2,008,161	493,718	(345,367)	(396,336)	(1,238,434)	(1,856,507)	(1,912,202)	(1,969,568)	(2,028,655)	(2,089,515)	(2,152,200)	(2,216,766)	(2,283,269)	(2,351,768)	1,200,000
	NOPAT		(2,220,481)	(6,359,176)	(1,563,439)	1,093,662	1,255,064	3,921,708	5,878,939	6,055,307	6,236,966	6,424,075	6,616,797	6,815,301	7,019,760	7,230,353	7,447,264	(3,800,000)
	Net Operating Cashflows	(47,000,000)	7,179,519	8,680,824	7,366,561	6,733,662	6,895,064	6,271,708	5,878,939	6,055,307	6,236,966	6,424,075	6,616,797	6,815,301	7,019,760	7,230,353	7,447,264	(3,800,000)
	Changes in WC																	
	[Rec - Pay]	(2,495,548)	(74,866)	(77,112)	(79,426)	(81,809)	(84,263)	(86,791)	(89,394)	(92,076)	(94,839)	(97,684)	(100,614)	(103,633)	(106,742)	(109,944)	3,774,741	-
	Net Cash flows	(49,495,548)	7,104,652	8,603,712	7,287,135	6,651,853	6,810,801	6,184,917	5,789,544	5,963,231	6,142,128	6,326,391	6,516,183	6,711,669	6,913,019	7,120,409	11,222,005	(3,800,000)
	Net Present Value=	0																
	IRR	11.00%																
	MIRR	11.00%																
	Working Capital:																	
		[NWOC](t) = 0.09*[Revenue(t)-Revenue(t-1)]			0.09													
	Incremental Costs:	$1,750,000																
	ACRS:	(0.2,0.32,0.19,0.12,0.12,and 0.05), in years 1 through 6 respectively.																
		0.2	0.32	0.19	0.12	0.12	0.05										0.33	0.45

Table 4: Deluxe Addition, Reduction in COGS

Net Present Value Example																		
Standard "single bullet" estimates																		
			Cost of capital=			0.11		Reduction in COGS		3%								
Cost of Project:			Inflation rate=			0.03		Additional cost for premium		$ 750,000								
i. machinery	$47,750,000		Tax rate=			0.24												
			Salvage Value=		$ 200,000	in real $												
			Sales =		1000	in 2024												
Total	$47,750,000		Price =		$ 27,500	in real $												
			Variable cost		$ 19,500	in 2024												
		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Capital Expenditures	(47,750,000)																
	Salvage																	200,000
	Environmental shutdown																	(5,200,000)
	Revenues		27,500,000	28,325,000	29,174,750	30,049,993	30,951,492	31,880,037	32,836,438	33,821,531	34,836,177	35,881,263	36,957,700	38,066,431	39,208,424	40,384,677	41,596,217	
	COGS		(18,915,000)	(19,482,450)	(20,066,924)	(20,668,931)	(21,288,999)	(21,927,669)	(22,585,499)	(23,263,064)	(23,960,956)	(24,679,785)	(25,420,178)	(26,182,784)	(26,968,267)	(27,777,315)	(28,610,635)	
	Incremental Costs(SGA)		(1,750,000)	(1,802,500)	(1,856,575)	(1,912,272)	(1,969,640)	(2,028,730)	(2,089,592)	(2,152,279)	(2,216,848)	(2,283,353)	(2,351,854)	(2,422,409)	(2,495,082)	(2,569,934)	(2,647,032)	
	Depreciation		(9,550,000)	(15,280,000)	(9,072,500)	(5,730,000)	(5,730,000)	(2,387,500)										
	Taxes		651,600	1,977,588	437,100	(417,309)	(471,085)	(1,328,673)	(1,958,723)	(2,017,485)	(2,078,010)	(2,140,350)	(2,204,560)	(2,270,697)	(2,338,818)	(2,408,983)	(2,481,252)	1,200,000
	NOPAT		(2,063,400)	(6,262,362)	(1,384,149)	1,321,480	1,491,768	4,207,465	6,202,624	6,388,703	6,580,364	6,777,775	6,981,108	7,190,541	7,406,258	7,628,445	7,857,299	(3,800,000)
	Net Operating Cashflows	(47,750,000)	7,486,600	9,017,638	7,688,351	7,051,480	7,221,768	6,594,965	6,202,624	6,388,703	6,580,364	6,777,775	6,981,108	7,190,541	7,406,258	7,628,445	7,857,299	(3,800,000)
	Changes in WC																	
	[Rec - Pay]	(2,475,000)	(74,250)	(76,478)	(78,772)	(81,135)	(83,569)	(86,076)	(88,658)	(91,318)	(94,058)	(96,879)	(99,786)	(102,779)	(105,863)	(109,039)	3,743,660	-
	Net Cash flows	(50,225,000)	7,412,350	8,941,161	7,609,579	6,970,345	7,138,199	6,508,889	6,113,966	6,297,385	6,486,306	6,680,895	6,881,322	7,087,762	7,300,395	7,519,407	11,600,958	(3,800,000)
	Net Present Value=	1,690,242																
	IRR	11.62%																
	MIRR	11.23%																
	Working Capital:																	
		[NWOC](t) = 0.09*[Revenue(t)-Revenue(t-1)]			0.09													
	Incremental Costs:	$1,750,000																
	ACRS:	(0.2,0.32,0.19,0.12,0.12,and 0.05), in years 1 through 6 respectively.																
		0.2	0.32	0.19	0.12	0.12	0.05											

Table 5: Catastrophic Failure

Net Present Value Example													
Standard "single bullet" estimates													
			Cost of capital=			0.11							
Cost of Project:			Inflation rate=			0.03		Reduction in COGS		3%			
i. machinery	$47,750,000		Tax rate=			0.24		Additional cost for premium		$ 750,000			
			Salvage Value=		$ 200,000	in real $							
			Sales =		1000	in 2024							
Total	$47,750,000		Price =		$ 27,500	in real $							
			Variable cost		$ 19,500	in 2024							
		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	1
			1	2	3	4	5	6	7	8	9	10	11
	Capital Expenditures	(47,750,000)											
	Salvage												
	Environmental shutdown												(5,500,000)
	Revenues		27,500,000	28,325,000	29,174,750	30,049,993	30,951,492	31,880,037	32,836,438	33,821,531	34,836,177	35,881,263	
	COGS		(18,915,000)	(19,482,450)	(20,066,924)	(20,668,931)	(21,288,999)	(21,927,669)	(22,585,499)	(23,263,064)	(23,960,956)	(24,679,785)	
	Incremental Costs(SGA)		(1,750,000)	(1,802,500)	(1,856,575)	(1,912,272)	(1,969,640)	(2,028,730)	(2,089,592)	(2,152,279)	(2,216,848)	(2,283,353)	
	Depreciation		(9,550,000)	(15,280,000)	(9,072,500)	(5,730,000)	(5,730,000)	(2,387,500)					
	Taxes		651,600	1,977,588	437,100	(417,309)	(471,085)	(1,328,673)	(1,958,723)	(2,017,485)	(2,078,010)	(2,140,350)	1,320,000
	NOPAT		(2,063,400)	(6,262,362)	(1,384,149)	1,321,480	1,491,768	4,207,465	6,202,624	6,388,703	6,580,364	6,777,775	(4,180,000)
	Net Operating Cashflows	(47,750,000)	7,486,600	9,017,638	7,688,351	7,051,480	7,221,768	6,594,965	6,202,624	6,388,703	6,580,364	6,777,775	(4,180,000)
	Changes in WC												
	[Rec - Pay]	(2,475,000)	(74,250)	(76,478)	(78,772)	(81,135)	(83,569)	(86,076)	(88,658)	(91,318)	(94,058)	3,229,314	-
	Net Cash flows	(50,225,000)	7,412,350	8,941,161	7,609,579	6,970,345	7,138,199	6,508,889	6,113,966	6,297,385	6,486,306	10,007,088	(4,180,000)
	Net Present Value=	(8,007,429)											
	IRR	6.80%											
	MIRR	9.31%											
	Working Capital:												
		[NWOC](t) = 0.09*[Revenue(t)-Revenue(t-1)]			0.09								
	Incremental Costs:	$1,750,000											
	ACRS:	(0.2,0.32,0.19,0.12,0.12,and 0.05), in years 1 through 6 respectively.											
		0.2	0.32	0.19	0.12	0.12	0.05						