Screw Detroit?

A Financial Analysis

of a Proposed Screw Deal with Detroit

Project 2
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Based on the information provided, I would choose to take on the project to supply Detroit with the machine screws.

Using the information provided in the base case (Tables 1 and 2), my annual operating cash flow will be $1.18 million dollars per year for each of the five years. The net present value (NPV) of the total cash flows is $557,851, and the internal rate of return (IRR) is 18.28 percent, which is higher than my required rate of return of 13 percent. Both of these numbers indicate that it will be beneficial for me to take on the project.

Looking at the margins of error creating the worst best case scenario (Table 4), my best case scenario obviously creates an even more positive NPV of almost $2.5 million and an IRR of 38.65 percent.

The worst case scenario (Table 3) offers a more worrying result; the NPV is negative, meaning I'd stand to lose $1.38 million of my initial investment, and the IRR of 0.62 percent is far less than the 13 percent required rate of return. Looking at sensitivity analyses and minimum quantities required (Table 7), the most sensitive input (where a change in one unit of that input results in the highest change in NPV and OCF) is selling price; the NPV sensitivity value for selling price is an astonishing 54,517 compared to relatively small numbers for the other questioned inputs. If I'm very concerned about a profitable project based on my analysis, I would consider setting up a contract with Detroit's auto manufacturers that requires screws be sold at at least a certain price. Based on my sensitivity analysis, that minimum price (if all other values are the projected base values) is $270 per ton.

A sensitivity analysis of NPV and OCF changes based on a change in output level (number of screws provided to Detroit) says that the sensitivity is 58.90 and 168.09, respectively (Tables 5 and 6). The minimum output level is 21, 682 tons of screws. Again, if I'm concerned about Detroit purchasing less than that output, I suggest the company set up a contract that requires a minimum order of screws per year.

Table 1

Source information

	Base Case		Margin of Error	Worst Case	Best Case	Sensitivity
Length of Project	5	years				
Output	25,000	tons per year				30,000
Initial Investment	$ 3,600,000		15%	$ 4,140,000	$ 3,060,000	
Salvage Value	$ 500,000		15%	$ 425,000	$ 575,000	
Depreciation Expense	$ 620,000	SL				
Selling Price	$ 280	per ton	10%	$ 252	$ 308	
Variable Costs	$ 185	per ton				
Fixed Costs	$ 850,000	per year				
Net Working Capital	$ 360,000		5%	$ 378,000	$ 342,000	
Required Return	13%					
Marginal Tax Rate	38%					

Table 2

Operating Cash Flows Base Case

Year		0	1	2	3	4	5
Revenue	$280/ton	None	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 7,000,000
Less: Variable Cost	$185/ton		$ 4,625,000	$ 4,625,000	$ 4,625,000	$ 4,625,000	$ 4,625,000
Less: Fixed Cost	$850,000/year		$ 850,000	$ 850,000	$ 850,000	$ 850,000	$ 850,000
Less: Depreciation	$620,000/year		$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 620,000
EBIT			**$ 905,000**	**$ 905,000**	**$ 905,000**	**$ 905,000**	**$ 905,000**
Add: Depreciation	$620,000/year		$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 620,000
Less: Taxes	38%		$ 343,900	$ 343,900	$ 343,900	$ 343,900	$ 343,900
OCF		None	**$ 1,181,100**	**$ 1,181,100**	**$ 1,181,100**	**$ 1,181,100**	**$ 1,181,100**
Working capital		$ (360,000)					$ 360,000
Cash Outflows		$ (3,600,000)					
Salvage Value (After Tax)	$500,000*(1.0-0.38)						$ 310,000
Total Cash Flows		**$ (3,960,000)**	**$ 1,181,100**	**$ 1,181,100**	**$ 1,181,100**	**$ 1,181,100**	**$ 1,851,100**
PV		$ (3,960,000)	$1,045,221.24	$924,974.55	$818,561.55	$724,390.75	$1,004,702.92
NPV	**$ 557,851**						
IRR	**18.28%**						

Table 3

Operating Cash Flows Worst Case

Year		0	1	2	3	4	5
Revenue	$252/ton	None	$ 6,300,000	$ 6,300,000	$ 6,300,000	$ 6,300,000	$ 6,300,000
Less: Variable Cost	$185/ton		$ 4,625,000	$ 4,625,000	$ 4,625,000	$ 4,625,000	$ 4,625,000
Less: Fixed Cost	$850,000/year		$ 850,000	$ 850,000	$ 850,000	$ 850,000	$ 850,000
Less: Depreciation	$743,000/year		$ 743,000	$ 743,000	$ 743,000	$ 743,000	$ 743,000
EBIT			**$ 82,000**	**$ 82,000**	**$ 82,000**	**$ 82,000**	**$ 82,000**
Add: Depreciation	$743,000/year		$ 743,000	$ 743,000	$ 743,000	$ 743,000	$ 743,000
Less: Taxes	38%		$ 31,160	$ 31,160	$ 31,160	$ 31,160	$ 31,160
OCF		None	**$ 793,840**	**$ 793,840**	**$ 793,840**	**$ 793,840**	**$ 793,840**
Working capital		$ (378,000)					$ 378,000
Cash Outflows		$ (4,140,000)					
Salvage Value (After Tax)	$425,000*(1.0-0.38)						$ 263,500
Total Cash Flows		**$ (4,518,000)**	**$ 793,840**	**$ 793,840**	**$ 793,840**	**$ 793,840**	**$ 1,435,340**
PV		$ (4,518,000)	$702,513.27	$621,693.16	$550,170.94	$486,876.94	$779,045.05
NPV	**$ (1,377,701)**						
IRR	**0.62%**						

Table 4

Operating Cash Flows Best Case

Year		0	1	2	3	4	5
Revenue	$308/ton	None	$ 7,700,000	$ 7,700,000	$ 7,700,000	$ 7,700,000	$ 7,700,000
Less: Variable Cost	$185/ton		$ 4,625,000	$ 4,625,000	$ 4,625,000	$ 4,625,000	$ 4,625,000
Less: Fixed Cost	$850,000/year		$ 850,000	$ 850,000	$ 850,000	$ 850,000	$ 850,000
Less: Depreciation	$497,000/year		$ 497,000	$ 497,000	$ 497,000	$ 497,000	$ 497,000
EBIT			**$ 1,728,000**	**$ 1,728,000**	**$ 1,728,000**	**$ 1,728,000**	**$ 1,728,000**
Add: Depreciation	$497,000/year		$ 497,000	$ 497,000	$ 497,000	$ 497,000	$ 497,000
Less: Taxes	38%		$ 656,640	$ 656,640	$ 656,640	$ 656,640	$ 656,640
OCF		None	**$ 1,568,360**	**$ 1,568,360**	**$ 1,568,360**	**$ 1,568,360**	**$ 1,568,360**
Working capital		$ (342,000)					$ 342,000
Cash Outflows		$ (3,060,000)					
Salvage Value (After Tax)	$575,000*(1.0-0.38)						$ 356,500
Total Cash Flows		**$ (3,402,000)**	**$ 1,568,360**	**$ 1,568,360**	**$ 1,568,360**	**$ 1,568,360**	**$ 2,266,860**
PV		$ (3,402,000)	$1,387,929.20	$1,228,255.93	$1,086,952.15	$961,904.56	$1,230,360.79
NPV	**$ 2,493,403**						
IRR	**38.65%**						

Table 5

Operating Cash Flows - Sensitivity Analysis Case

Year		0	1	2	3	4	5
Revenue	$280/ton	None	$ 8,400,000	$ 8,400,000	$ 8,400,000	$ 8,400,000	$ 8,400,000
Less: Variable Cost	$185/ton		$ 5,550,000	$ 5,550,000	$ 5,550,000	$ 5,550,000	$ 5,550,000
Less: Fixed Cost	$850,000/year		$ 850,000	$ 850,000	$ 850,000	$ 850,000	$ 850,000
Less: Depreciation	$620,000/year		$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 620,000
EBIT			**$ 1,380,000**	**$ 1,380,000**	**$ 1,380,000**	**$ 1,380,000**	**$ 1,380,000**
Add: Depreciation	$620,000/year		$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 620,000
Less: Taxes	38%		$ 524,400	$ 524,400	$ 524,400	$ 524,400	$ 524,400
OCF		None	**$ 1,475,600**	**$ 1,475,600**	**$ 1,475,600**	**$ 1,475,600**	**$ 1,475,600**
Working capital		$ (360,000)					$ 0
Cash Outflows		$ (3,600,000)					
Salvage Value (After Tax)	$500,000*(1.0-0.38)						$ 310,000
Total Cash Flows		**$ (3,960,000)**	**$ 1,475,600**	**$ 1,475,600**	**$ 1,475,600**	**$ 1,475,600**	**$ 1,785,600**
PV		$ (3,960,000)	$1,305,840.71	$1,155,611.25	$1,022,664.82	$905,013.11	$969,152.35
NPV	**$ 1,398,282**						
IRR	**26.32%**						

Table 6

Sensitivity Analysis and Minimum Output

Sensitivity

ΔOCF / ΔQ	Q = 30,000	Q = 25,000	Δ
OCF	$ 1,475,600	$ 1,181,100	$ 294,500
Q	30,000	25,000	5,000
ΔOCF / ΔQ			**58.90**

ΔNPV / ΔQ	Q = 30,000	Q = 25,000	Δ
NPV	$ 1,398,282	$ 557,851	$ 840,431
Q	30,000	25,000	5,000
ΔNPV / ΔQ			**168.09**

Minimum Output

NPV (Base)	$ 557,851
NPV Sensitivity	168.09
Change	3,318.84
Base Quantity	25,000
Less: Change	3,318.84
Minimum	**21,682**

Table 7

Sensitivity Analyses and Minimums - Uncertainties

	Base Case		Worst Case					
Initial Investment								
ΔOCF / ΔInitial Invest	$	3,600,000	$	4,140,000	Δ		Minimum Output	
OCF	$	1,181,100	$	1,181,100	$	-	NPV (Base)	$ 557,851
Initial Investment	$	3,600,000	$	4,140,000	$	(540,000)	NPV Sensitivity	(1.00)
ΔOCF / Δ						**-**	Change	(557,851)
ΔNPV / Δ	$	3,600,000	$	4,140,000	Δ		Base Quantity	$ 3,600,000
NPV	$	557,851	$	17,851	$	540,000	Less: Change	$ (557,851)
Initial Investment	$	3,600,000	$	4,140,000	$	(540,000)	**Maximum**	**$ 4,157,851**
ΔNPV / Δ						**(1.00)**		
Salvage Value								
ΔOCF / Δ Salvage value	$	500,000	$	425,000	Δ		Minimum Output	
OCF	$	1,181,100	$	1,186,800	$	(5,700)	NPV (Base)	$ 557,851
Salvage Value	$	500,000	$	425,000	$	75,000	NPV Sensitivity	0.07
ΔOCF / Δ						**(0.08)**	Change	8,061,431
ΔNPV / Δ	$	500,000	$	425,000	Δ		Base Quantity	$ 500,000
NPV	$	557,851	$	552,661	$	5,190	Less: Change	$ 8,061,431
Salvage Value	$	500,000	$	425,000	$	75,000	**Minimum**	**$ -**
ΔNPV / Δ						**0.07**		
Selling Price								
ΔOCF / Δ Selling Price	$	280	$	252	Δ		Minimum Output	
OCF	$	1,181,100	$	747,100	$	434,000	NPV (Base)	$ 557,851
Selling Price	$	280	$	252	$	28	NPV Sensitivity	54,517.07
ΔOCF / Δ						**15,500.00**	Change	10
ΔNPV / Δ	$	280	$	252	Δ		Base Quantity	$ 280
NPV	$	557,851	$	(968,627)	$	1,526,478	Less: Change	$ 10
Selling Price	$	280	$	252	$	28	**Minimum**	**$ 270**
ΔNPV / Δ						**54,517.07**		
Net Working Capital								
ΔOCF / Δ NWC	$	360,000	$	378,000	Δ		Minimum Output	
OCF	$	1,181,100	$	1,181,100	$	-	NPV (Base)	$ 557,851
Net Working Capital	$	360,000	$	378,000	$	(18,000)	NPV Sensitivity	(0.46)
ΔOCF / Δ						**-**	Change	(1,220,087)
ΔNPV / Δ	$	360,000	$	378,000	Δ		Base Quantity	$ 360,000
NPV	$	557,851	$	549,621	$	8,230	Less: Change	$ (1,220,087)
Net Working Capital	$	360,000	$	378,000	$	(18,000)	**Maximum**	**$ 1,580,088**
ΔNPV / Δ						**(0.46)**		

Note: All values set to base case value except worst-case value, which is based on margins of error.