GREAT AMERICAN GROUP
a B. Riley Financial company

Palisade Risk Conference
San Antonio Texas

How to avoid "Chapter 22" in Oil & Gas Bankruptcy Work Using @RISK

November 12-13, 2019

ADVISORY SERVICES ♦ VALUATIONS ♦ TRANSACTION SUPPORT

Overview

- Commodity price volatility typically is very high; since 1986 the standard WTI contract has seen an average annual price volatility of just under 40%.
- This makes restructuring work that much more difficult, because modeling a company going through a workout with top-line revenue driven by oil and gas prices is very challenging.
- The “Shale Revolution” has brought very steep decline curves to the forefront.
- Bankruptcy work in this business needs to be done differently to account for these unique elements.
- The assumptions that drive the cash flow models used to restructure an oil company in distress should always be simulated.

“Chapter 22”

- “Chapter 22” is a non-technical term that refers to a company that files for bankruptcy a second time, after just 2-3 years.
- It is a growing phenomenon here in the Texas Energy Market, and its root cause can be traced to a failure to restructure the company properly the first time.
- Given the often-extreme volatility that we see with oil, natural gas, and natural gas liquids prices, this kind of work should be done using probabilistic models.
- Specifically, Monte Carlo Simulation using @RISK results in far better post-bankruptcy structures that can endure severe price movements.
- These techniques help the companies, lawyers, and bankers to avoid over levering the company a second time.

Key Elements

These are the some of the key elements that can be simulated, tested, and stressed:

- Crude Oil Prices
- Natural Gas Prices
- Natural Gas Liquids Prices
- Production Volumes
- Lease Operating Expenses
- Capital Expenditures
- Floating Interest Rates
- G&A Expenses
- Asset Divestitures
- Covenants
- Seniority Waterfalls
- Debt Service Coverage Ratios
- Bank Recovery Levels
- Probabilities of Default

Ground Rules

- My small Case Study illustrates the use of these techniques to properly restructure a real distressed oil company, including the functional model in Excel with @RISK.
- Names will be redacted, and many of the details obscured, to remain in compliance with CAs and NDAs that exist to this day.
- It was a private capital funded firm, and the negotiations were very difficult.
- The small private company did survive and has not been forced into a “Chapter 22” situation.
- I have simplified the numbers significantly to focus on the critical takeaways.

Simple Model

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Inputs & Assumptions

LOE	**35%**		
Taxes	**7.0%**		
Capital	**$75,000**		
A/R	**0.14**		
A/P	**0.11**		
G&A	**7.5%**		
Term Loan	**$15,000**		
Debt	**20%**	**0%**	**50%**
Equity	**$60,000**		
Rate	**7.5%**		
Oil	**$56.00**		
Min	**$27.50**		
Likely	**$40.00**		
Max	**$85.00**		

Severe Hyperbolic Decline			
	IP	950.0	2.04
	b	1.80	3.62
	D	0.58	0.28
	t	1	262.3
	IP	950.0	3.09
	b	1.8	7.61
	D	0.58	0.13
	t	2	124.8
	IP	950.0	4.13
	b	1.8	12.86
	D	0.58	0.08
	t	3	73.9
	IP	950.0	5.18
	b	1.8	19.28
	D	0.58	0.05
	t	4	49.3

Simple Model

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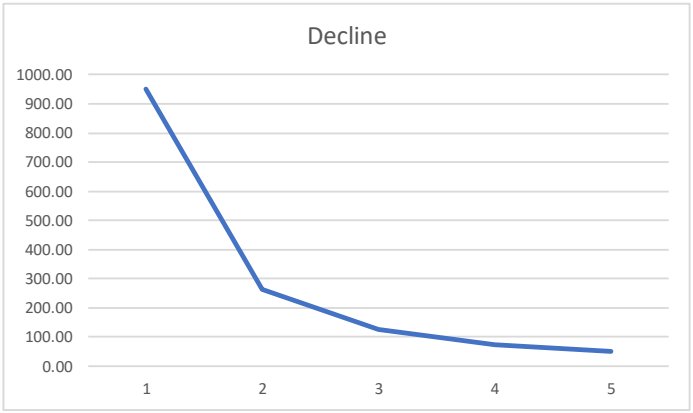
Cash Flow

Year	1	2	3	4	5
Net Oil ('000's Barrels)	950.00	262.34	124.83	73.90	49.26
Oil Price	$56.00	$56.00	$56.00	$56.00	$56.00
Revenue ('000's)	$53,200	$14,691	$6,990	$4,138	$2,759
LOE	$18,620	$5,142	$2,447	$1,448	$966
Production Taxes	$3,724	$1,028	$489	$290	$193
G&A	$3,990	$1,102	$524	$310	$207
Working Capital	($5,247)	($1,449)	($689)	($408)	($272)
Cash Flow	**$25,343**	**$6,998**	**$3,330**	**$1,971**	**$1,314**



Simple Model

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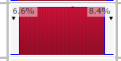
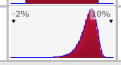
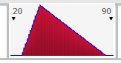
Waterfall

Year	**1**	**2**	**3**	**4**	**5**	
Cash Flow Available for Debt Service	$25,343	$6,998	$3,330	$1,971	$1,314	
Term Loan Drawn	$15,000	$12,000	$9,000	$6,000	$3,000	
Minimum Interest Expense	$1,125	$900	$675	$450	$225	
Amortization Required	$3,000	$3,000	$3,000	$3,000	$3,000	
Cash Flow After Debt Service	$21,218	$3,098	($345)	($1,479)	($1,911)	
Default	**$0**	**$0**	**$345**	**$1,479**	**$1,911**	**$3,734**
Ending Balance	$12,000	$9,000	$6,000	$3,000	$0	
Cash Flow Available for Equity Investors	$21,218	$3,098	($690)	($2,957)	($3,822)	

Year One

@RISK Input Results

Performed By: Thomas McNulty

	Name	Worksheet	Cell	Graph	Min	Mean	Max	5%	95%	Errors
	LOE	Inputs	B5		32%	35%	39%	32%	38%	0
	G&A	Inputs	B10		6.8%	7.5%	8.3%	6.8%	8.2%	0
	Debt	Inputs	B12		0%	25%	50%	2%	47%	0
	Rate	Inputs	B14		0.0%	7.1%	9.4%	5.3%	8.3%	0
Category: Oil										
	Oil Price	Inputs	B17		$27.57	$50.83	$84.85	$33.49	$73.63	0

Year One

@RISK Detailed Statistics

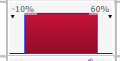
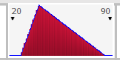
Performed By: Thomas McNulty

Name	Default	LOE	G&A	Debt	Rate	Oil Price
Minimum	$0	32%	6.8%	0%	-1.4%	$27.57
Maximum	$0	39%	8.3%	50%	9.4%	$84.85
Mean	$0	35%	7.5%	25%	7.1%	$50.83
Std Deviation	$0	2%	0.4%	14%	1.0%	$12.35
Variance	0	0.000408337	1.87502E-05	0.02083354	9.25161E-05	152.4321
Skewness	n/a	9.20524E-08	5.34744E-08	5.34024E-08	-1.137989	0.4589226
Kurtosis	n/a	1.8	1.8	1.8	5.378803	2.400028
Errors	0	0	0	0	0	0
Mode	$0	34%	8.1%	28%	7.5%	$40.22
5% Perc	$0	32%	6.8%	2%	5.3%	$33.49
10% Perc	$0	32%	6.9%	5%	5.8%	$35.98
15% Perc	$0	33%	7.0%	7%	6.1%	$37.88
20% Perc	$0	33%	7.1%	10%	6.4%	$39.49
25% Perc	$0	33%	7.1%	12%	6.6%	$40.95
30% Perc	$0	34%	7.2%	15%	6.7%	$42.44
35% Perc	$0	34%	7.3%	17%	6.9%	$43.99
40% Perc	$0	34%	7.4%	20%	7.0%	$45.60
45% Perc	$0	35%	7.4%	22%	7.1%	$47.28
50% Perc	$0	35%	7.5%	25%	7.2%	$49.03
55% Perc	$0	35%	7.6%	27%	7.3%	$50.88
60% Perc	$0	36%	7.7%	30%	7.4%	$52.83
65% Perc	$0	36%	7.7%	32%	7.5%	$54.91
70% Perc	$0	36%	7.8%	35%	7.6%	$57.14
75% Perc	$0	37%	7.9%	38%	7.7%	$59.57
80% Perc	$0	37%	8.0%	40%	7.9%	$62.25
85% Perc	$0	37%	8.0%	42%	8.0%	$65.30
90% Perc	$0	38%	8.1%	45%	8.1%	$68.91
95% Perc	$0	38%	8.2%	47%	8.3%	$73.63

Year Two

@RISK Input Results

Performed By: Thomas McNulty

	Name	Worksheet	Cell	Graph	Min	Mean	Max	5%	95%	Errors
	LOE	Inputs	B5		32%	35%	38%	32%	38%	0
	G&A	Inputs	B10		6.8%	7.5%	8.3%	6.8%	8.2%	0
	Debt	Inputs	B12		0%	25%	50%	2%	47%	0
	Rate	Inputs	B14		0.0%	7.1%	9.3%	5.3%	8.3%	0
Category: Oil										
	Oil Price	Inputs	B17		$27.56	$50.83	$84.93	$33.49	$73.63	0

Year Two

@RISK Detailed Statistics

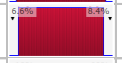
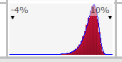
Performed By: Thomas McNulty

Name	Default	LOE	G&A	Debt	Rate	Oil Price
Minimum	$0	32%	6.8%	0%	0.0%	$27.56
Maximum	$6,398	38%	8.3%	50%	9.3%	$84.93
Mean	$681	35%	7.5%	25%	7.1%	$50.83
Std Deviation	$1,230	2%	0.4%	14%	1.0%	$12.35
Variance	1512159	0.000408337	1.87502E-05	0.02083354	9.25233E-05	152.4321
Skewness	1.83702	-4.87873E-08	3.35053E-08	6.87928E-08	-1.138739	0.4589235
Kurtosis	5.434387	1.8	1.8	1.8	5.386798	2.400031
Errors	0	0	0	0	0	0
Mode	$0	33%	8.1%	10%	7.5%	$40.22
5% Perc	$0	32%	6.8%	2%	5.3%	$33.49
10% Perc	$0	32%	6.9%	5%	5.8%	$35.98
15% Perc	$0	33%	7.0%	7%	6.1%	$37.88
20% Perc	$0	33%	7.1%	10%	6.4%	$39.49
25% Perc	$0	33%	7.1%	12%	6.6%	$40.95
30% Perc	$0	34%	7.2%	15%	6.7%	$42.44
35% Perc	$0	34%	7.3%	17%	6.9%	$43.99
40% Perc	$0	34%	7.4%	20%	7.0%	$45.60
45% Perc	$0	35%	7.4%	22%	7.1%	$47.28
50% Perc	$0	35%	7.5%	25%	7.2%	$49.03
55% Perc	$0	35%	7.6%	27%	7.3%	$50.88
60% Perc	$0	36%	7.7%	30%	7.4%	$52.83
65% Perc	$0	36%	7.7%	32%	7.5%	$54.91
70% Perc	**$410**	36%	7.8%	35%	7.6%	$57.14
75% Perc	**$932**	37%	7.9%	37%	7.7%	$59.57
80% Perc	**$1,469**	37%	8.0%	40%	7.9%	$62.25
85% Perc	**$2,053**	37%	8.0%	42%	8.0%	$65.30
90% Perc	**$2,739**	38%	8.1%	45%	8.1%	$68.91
95% Perc	**$3,584**	38%	8.2%	47%	8.3%	$73.63

Year Three

@RISK Input Results

Performed By: Thomas McNulty

	Name	Worksheet	Cell	Graph	Min	Mean	Max	5%	95%	Errors
	LOE	Inputs	B5		32%	35%	39%	32%	38%	0
	G&A	Inputs	B10		6.8%	7.5%	8.3%	6.8%	8.2%	0
	Debt	Inputs	B12		0%	25%	50%	2%	47%	0
	Rate	Inputs	B14		0.0%	7.1%	9.4%	5.3%	8.3%	0
Category: Oil										
	Oil Price	Inputs	B17		$27.52	$50.83	$84.94	$33.49	$73.62	0

Year Three

@RISK Detailed Statistics

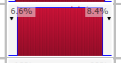
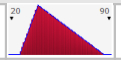
Performed By: Thomas McNulty

Name	Default	LOE	G&A	Debt	Rate	Oil Price
Minimum	$0	32%	6.8%	0%	0.0%	$27.52
Maximum	$7,591	39%	8.3%	50%	9.4%	$84.94
Mean	$2,056	35%	7.5%	25%	7.1%	$50.83
Std Deviation	$2,082	2%	0.4%	14%	1.0%	$12.35
Variance	4334659	0.000408338	1.87502E-05	0.02083354	9.25485E-05	152.4321
Skewness	0.5786871	-9.13493E-08	-1.45713E-07	-1.35552E-08	-1.142062	0.4589225
Kurtosis	1.997422	1.8	1.8	1.8	5.432353	2.400029
Errors	0	0	0	0	0	0
Mode	$0	37%	7.9%	34%	7.5%	$40.22
5% Perc	$0	32%	6.8%	2%	5.3%	$33.49
10% Perc	$0	32%	6.9%	5%	5.8%	$35.98
15% Perc	$0	33%	7.0%	7%	6.1%	$37.88
20% Perc	$0	33%	7.1%	10%	6.4%	$39.49
25% Perc	$0	33%	7.1%	12%	6.6%	$40.95
30% Perc	$0	34%	7.2%	15%	6.7%	$42.44
35% Perc	$166	34%	7.3%	17%	6.9%	$43.99
40% Perc	$622	34%	7.4%	20%	7.0%	$45.60
45% Perc	$1,063	35%	7.4%	22%	7.1%	$47.28
50% Perc	$1,518	35%	7.5%	25%	7.2%	$49.03
55% Perc	$1,973	35%	7.6%	27%	7.3%	$50.88
60% Perc	$2,431	36%	7.7%	30%	7.4%	$52.83
65% Perc	$2,880	36%	7.7%	32%	7.5%	$54.91
70% Perc	$3,333	36%	7.8%	35%	7.6%	$57.14
75% Perc	$3,793	37%	7.9%	37%	7.7%	$59.57
80% Perc	$4,246	37%	8.0%	40%	7.9%	$62.25
85% Perc	$4,714	37%	8.0%	42%	8.0%	$65.30
90% Perc	$5,217	38%	8.1%	45%	8.1%	$68.91
95% Perc	$5,831	38%	8.2%	47%	8.3%	$73.62

Year Four

@RISK Input Results

Performed By: Thomas McNulty

	Name	Worksheet	Cell	Graph	Min	Mean	Max	5%	95%	Errors
	LOE	Inputs	B5		32%	35%	38%	32%	38%	0
	G&A	Inputs	B10		6.8%	7.5%	8.3%	6.8%	8.2%	0
	Debt	Inputs	B12		0%	25%	50%	2%	48%	0
	Rate	Inputs	B14		0.0%	7.1%	9.4%	5.3%	8.3%	0
Category: Oil										
	Oil Price	Inputs	B17		$27.57	$50.83	$84.88	$33.49	$73.62	0

Year Four

@RISK Detailed Statistics

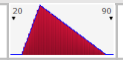
Performed By: Thomas McNulty

Name	Default	LOE	G&A	Debt	Rate	Oil Price
Minimum	$0	32%	6.8%	0%	0.0%	$27.57
Maximum	$7,712	38%	8.3%	50%	9.4%	$84.88
Mean	$2,689	35%	7.5%	25%	7.1%	$50.83
Std Deviation	$2,241	2%	0.4%	14%	1.0%	$12.35
Variance	5023097	0.000408337	1.87502E-05	0.02083354	9.2531E-05	152.4321
Skewness	0.2780338	-1.33561E-07	-8.66569E-08	-5.68993E-08	-1.13979	0.4589236
Kurtosis	1.747063	1.8	1.8	1.8	5.40186	2.40003
Errors	0	0	0	0	0	0
Mode	$0	37%	7.4%	19%	7.5%	$40.22
5% Perc	$0	32%	6.8%	2%	5.3%	$33.49
10% Perc	$0	32%	6.9%	5%	5.8%	$35.98
15% Perc	$0	33%	7.0%	7%	6.1%	$37.88
20% Perc	$0	33%	7.1%	10%	6.4%	$39.49
25% Perc	$349	33%	7.1%	13%	6.6%	$40.95
30% Perc	$775	34%	7.2%	15%	6.7%	$42.44
35% Perc	$1,198	34%	7.3%	17%	6.9%	$43.99
40% Perc	$1,631	34%	7.4%	20%	7.0%	$45.60
45% Perc	$2,058	35%	7.4%	22%	7.1%	$47.28
50% Perc	$2,488	35%	7.5%	25%	7.2%	$49.03
55% Perc	$2,917	35%	7.6%	27%	7.3%	$50.88
60% Perc	$3,350	36%	7.7%	30%	7.4%	$52.83
65% Perc	$3,774	36%	7.7%	32%	7.5%	$54.91
70% Perc	$4,197	36%	7.8%	35%	7.6%	$57.14
75% Perc	$4,618	37%	7.9%	37%	7.7%	$59.57
80% Perc	$5,058	37%	8.0%	40%	7.9%	$62.25
85% Perc	$5,494	37%	8.0%	42%	8.0%	$65.30
90% Perc	$5,931	38%	8.1%	45%	8.1%	$68.91
95% Perc	$6,419	38%	8.2%	48%	8.3%	$73.62

Year Five

@RISK Input Results

Performed By: Thomas McNulty

	Name	Worksheet	Cell	Graph	Min	Mean	Max	5%	95%	Errors
	LOE	Inputs	B5		32%	35%	39%	32%	38%	0
	G&A	Inputs	B10		6.8%	7.5%	8.3%	6.8%	8.2%	0
	Debt	Inputs	B12		0%	25%	50%	2%	47%	0
	Rate	Inputs	B14		0.0%	7.1%	9.4%	5.3%	8.3%	0
Category: Oil										
	Oil Price	Inputs	B17		$27.54	$50.83	$84.88	$33.49	$73.62	0

Year Five

@RISK Detailed Statistics

Performed By: Thomas McNulty

Name	Default / 5	LOE	G&A	Debt	Rate	Oil Price
Minimum	$0	32%	6.8%	0%	-1.5%	$27.54
Maximum	$7,399	39%	8.3%	50%	9.4%	$84.88
Mean	$2,916	35%	7.5%	25%	7.1%	$50.83
Std Deviation	$2,198	2%	0.4%	14%	1.0%	$12.35
Variance	4829470	0.000408337	1.87502E-05	0.02083354	9.25234E-05	152.432
Skewness	0.1562664	2.29608E-08	1.1141E-08	-2.38442E-07	-1.138754	0.4589226
Kurtosis	1.72593	1.8	1.8	1.8	5.387331	2.400027
Errors	0	0	0	0	0	0
Mode	$0	37%	7.9%	3%	7.5%	$40.22
5% Perc	$0	32%	6.8%	2%	5.3%	$33.49
10% Perc	$0	32%	6.9%	5%	5.8%	$35.98
15% Perc	$13	33%	7.0%	7%	6.1%	$37.88
20% Perc	$415	33%	7.1%	10%	6.4%	$39.49
25% Perc	$817	33%	7.1%	12%	6.6%	$40.95
30% Perc	$1,217	34%	7.2%	15%	6.7%	$42.44
35% Perc	$1,617	34%	7.3%	17%	6.9%	$43.99
40% Perc	$2,025	34%	7.4%	20%	7.0%	$45.60
45% Perc	$2,416	35%	7.4%	22%	7.1%	$47.28
50% Perc	$2,825	35%	7.5%	25%	7.2%	$49.03
55% Perc	$3,227	35%	7.6%	28%	7.3%	$50.88
60% Perc	$3,624	36%	7.7%	30%	7.4%	$52.83
65% Perc	$4,026	36%	7.7%	32%	7.5%	$54.91
70% Perc	$4,428	36%	7.8%	35%	7.6%	$57.14
75% Perc	$4,822	37%	7.9%	37%	7.7%	$59.57
80% Perc	$5,227	37%	8.0%	40%	7.9%	$62.25
85% Perc	$5,628	37%	8.0%	42%	8.0%	$65.30
90% Perc	$6,033	38%	8.1%	45%	8.1%	$68.91
95% Perc	$6,452	38%	8.2%	47%	8.3%	$73.62

Key Variables

- Decline-For the unconventional shale plays the declines are hyperbolic and then exponential. The curve is rapid and steep. It does not in any way lend itself to traditional debt finance structures.
- LOE-Lease Operating Expenses must be managed carefully, but they are almost never the issue. In general, they have been coming down.
- G&A-Leaner operators do better, and will continue to do so.
- Leverage-This type of cash flow profile does not lend itself to leverage of any kind.
- Rate-Even with reasonably low interest rates, debt can often still be a problem.
- Prices-For debt capital it is essential to model for lower rather than higher prices.

Leverage and Default

- Year One-No default occurred in the simulations.
- Year Two-Debt levels of 35% triggered modest default outcomes.
- Year Three-Debt levels below 20% triggered some default outcomes.
- Year Four-Even in the mid-teens, there were events of default.
- Year Five-By Year Five, even levels below 10% caused some occurrences of default.
- The cumulative probability of default is shown here:

During Year 1	**0.0%**
By Year 2	**3.4%**
By Year 3	**12.2%**
By Year 4	**17.8%**
By Year 5	**26.3%**

The Very Nature of this Business……..

- Volatility
- Steep Declines
- Mean Reversion

So What works?

- Lend to the last well.
- Lend to mean-reversion in prices and you might not get into trouble.
- Understand that Debt is a call option on equity.
- If you have to hedge to borrow, then do not borrow!
- Mix in some conventional production.
- Just because you can borrow doesn't mean that you should.

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Tom draws on 20 years of a rare combination of industry, banking, consulting, and government experience to provide transaction, litigation, and valuation advisory services to his clients. As an advisor, and in his corporate career, he has valued more than $46 billion in assets, businesses, and transactions. He has also advised on or executed $11 billion plus in M&A and principal investment deals, and executed or valued more than $13 billion notional in derivative instruments. His expert litigation work has included shareholder disputes, business valuation, derivatives and hedging, and damages assessments.

Tom received his BA from Yale University, his MBA from Northwestern University, and has the following certifications and licenses: Certificate in Quantitative Finance, Financial Risk Manager, Series 63, Series 79.