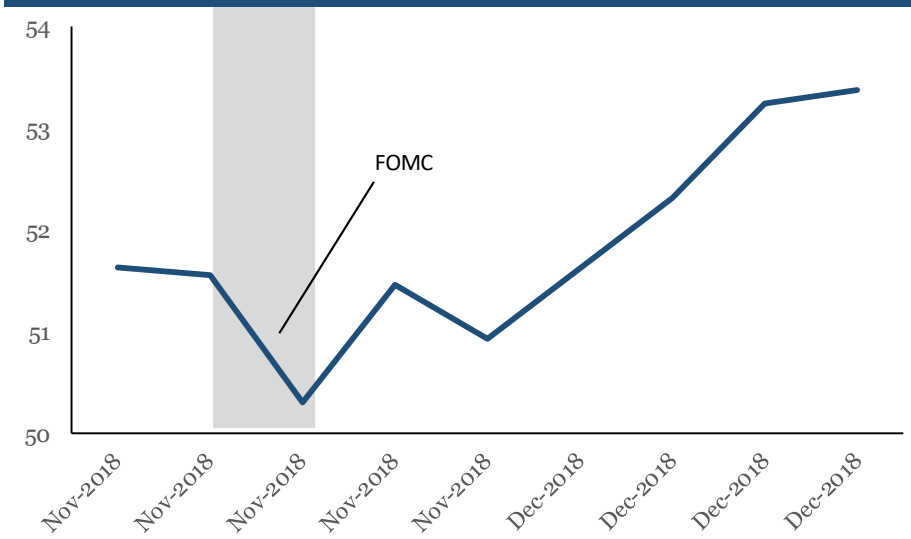
Penn State Asset Management Group

The Pennsylvania State University

February 11, 2019

AMG
PENNSYLVANIA STATE UNIVERSITY

Graph Commentary



Futures / Options / Underlying
Underlying Price: **2.674**
Trade Name: **NGJ9P 2.60; GKJ9C 2.70, COALINDIA**
Expiration Date(s): **Apr-19 (43d 3/26/19)**
Delta: **253.19**
Gamma: **628.94**
Theta: **-0.51**
Vega: **2.28**
Rho: **1.11**
Theoretical Edge: **1192.32**

Energy Sector

Sector Size: $100 MM
# of Holdings: 2000

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I. Macroeconomic Overview

Derivative Name, (CLH9)

Macroeconomic Overview

Macroeconomic Drivers

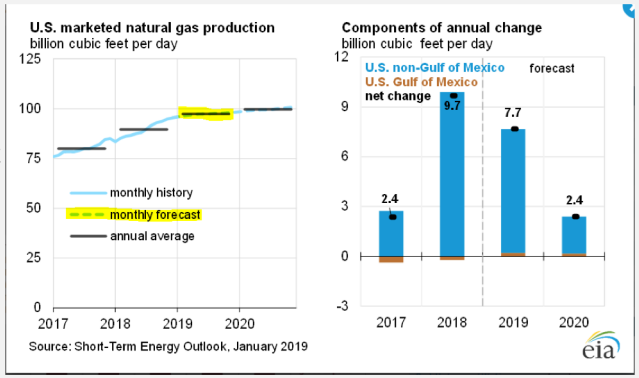
Driver #1: South African Natural Gas Find

Total, a French petroleum refining company, has just yielded a huge natural gas find that will likely open new exploration in the area. An estimated 1 billion barrels equivalent of natural gas, this massive find could change energy fortunes of South Africa. We should see this start to be priced into the market after electronic scans of the area scheduled to be completed within the next month.

Driver #2:

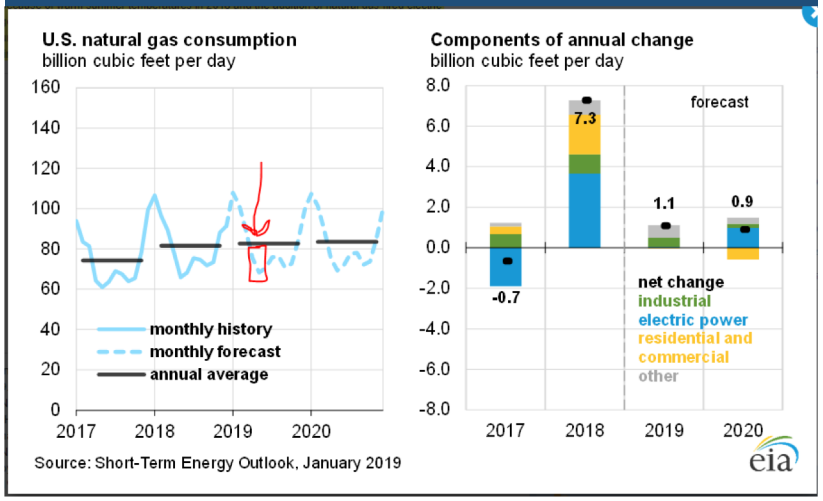
Although USA LNG exports are not likely to sneak up on anybody, they are priced into the market. Supply should remain at its constant growth, all else equal. Demand will likely continue to diminish throughout the remainder of Q1 and likely not pick up again until early Q2. Storages are currently low but not quite reaching weekly storage drop predictions (meaning demand is diminishing). Per https://www.eia.gov/outlooks/steo/report/natgas.php (New report released February 12th, 2019…this data is from mid-January).

Driver #3 (Graph for Driver #2)



Coal India LTD earnings are being released tomorrow and market consensus indicates that revenue growth is expected to overshoot forecasts by as much as 14%. Although this is likely priced into the market, Consumers will be happy to see Coal India LTD reaching Profitability and their stock price should rise.

Benchmark



Market Pros & Cons

- ✓ Delays within South Africa drilling could increase US price of Natural Gas, I am hoping that they stick to schedule. Expectations cause price movement.
- ✓ Consumption of Natural Gas is currently diminishing. With weather permitting, this should continue.
- ✗ New data is released tomorrow, February 12th. We likely will see new consumption changes based on historical annual average.
- ✗ It is possible that all of Coal India LTD's profitability is already priced into the market and if they don't reach this forecast the price will fall dramatically (3.6% rise upon higher forecast). The plan is to sell immediately.

II. Trade / Hedge

Natural Gas, (NGJ9P 2.60)(GKJ9C 2.70)(COALINDIA)

Trade Breakdown

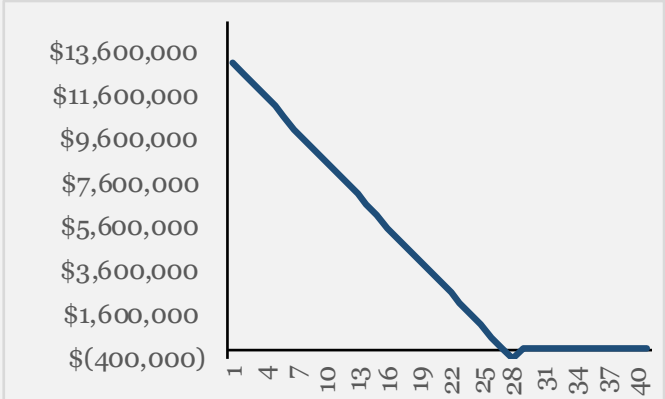
Trade Breakdown

Price Target (Underlying): =< 2.60

Contract Month / Year: April '19

Trade Name: Synthetic Futures Contract

Parity Graph



Trade Breakdown

Setup
- Short a Futures Contact at $2.60 (x500 contracts)
- Buy an Options Call at $2.70 (x500 contracts)
- Purchase Coal India LTD equity (x1000) at 218.65

Profit Potential
- Max Profit = $13,114,500
    - Underlying = $0.00

Risk Potential
- Max Loss = -$385,000
    - Underlying = 2.7

Breakeven Points
- **Upper Breakeven** = $2.70
- **Lower Breakeven** = $2.55

Time
- Time is my friend. Lower consumption, from cyclicality, helps drive price down over time.

Implied Volatility
- Because my futures contract is hedged well, we want higher volatility so there is more of a chance for the price to swing low.

Other Notes
- Total Cost = $788,083
- Mkt Value = $788,083

III. Product Analysis

Natural Gas, (NGJ9P 2.60)(GKJ9C 2.70)(COALINDIA)

Greeks and Theoretical Edge

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Greeks

Call Option		Delta	Gamma	Theta	Vega	Rho
0.12		0.49	1.26	-0.00102	0.00457	0.00221

Put Option		Delta	Gamma	Theta	Vega	Rho
0.14		-0.51	1.26	0.00	0.00	0.00

Position	Theoretical Edge	Delta	Gamma	Theta	Vega	Rho
500	1192.32	246.81	628.94	-0.51	2.28	1.11
-500	0.00	-500.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00

Breakdown of Greeks

Delta:
Call Option: As a hedge, if the underlying prices rises then the call option will be worth money. I can only lose $0.10 (per unit per contract) because the call option will kick in (and the premium).
Futures Put: I am shorting a futures contract, delta is -1. Obligation to sell someone 500 contracts of Natural Gas for 2.60.
Gamma:
Call Option: I want big moves or quick changes in the price of the underlying. Because Natural Gas is volatile, this works in my favor.
Theta:
Call Option: As time goes on, the value of the call becomes less valuable. I cant avoid this and this is bad for the trade.
Vega:
Call Option: I want implied volatility to rise so that there is a greater chance to land positive. This is bad since volatility is relatively low compared to the last 4 months, however, volatility for IMV is high for NatGas compared to other commodities.
Rho:
Call Option: Interest rates rising would be a good thing; however, this works against me given the Feds current 'wait-and-see' policy on interest rates.

Breakdown Theoretical Edge

The theoretical edge for the call option is 1192.32. This is great because it means I am buying an option at a price less than the theoretical value which also indicated that the market does not think the price is going to increase beyond my call strike price (2.70).

The theoretical edge for the futures put is zero. This is neither good or bad.

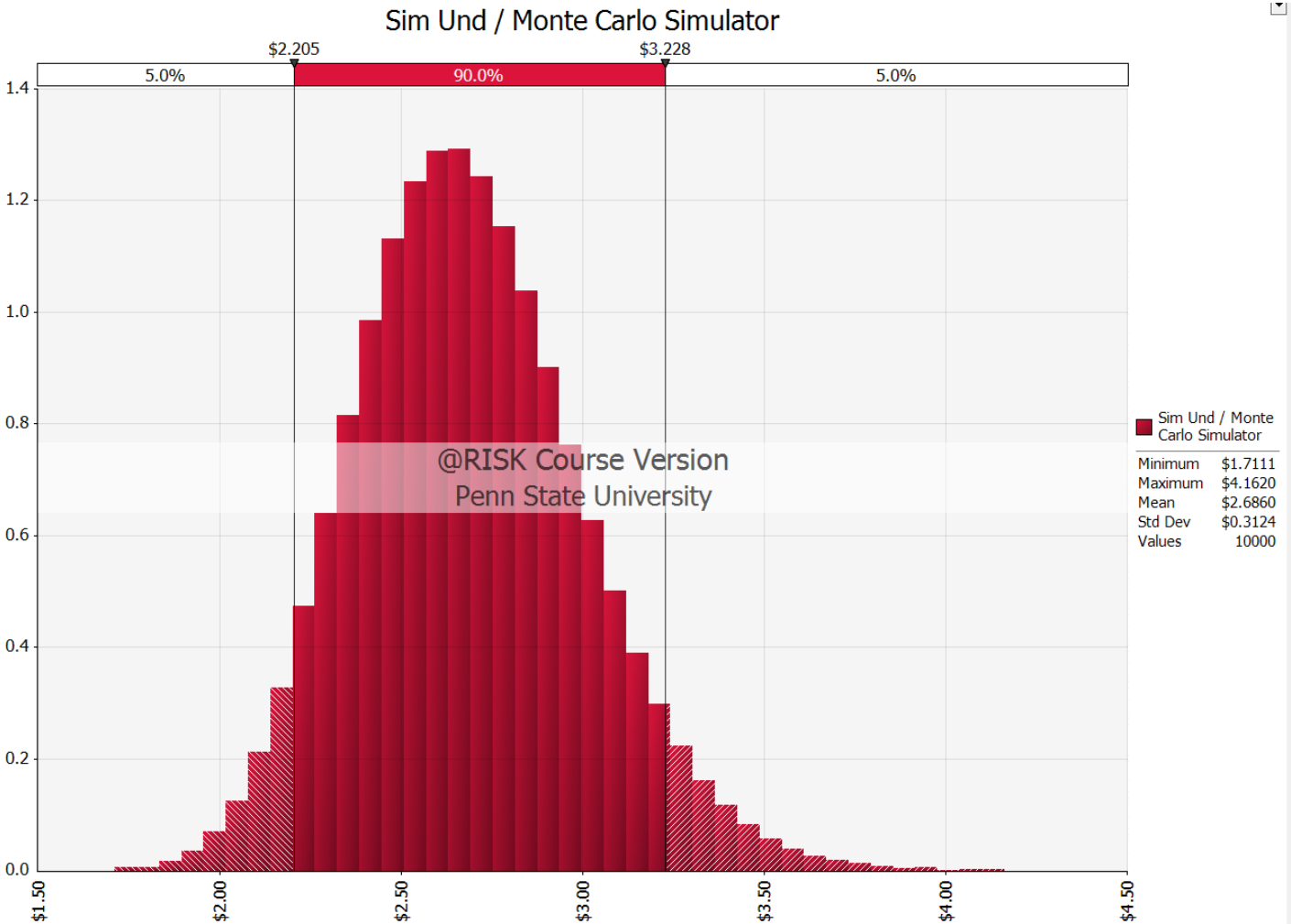
The total theoretical edge of my portfolio is currently 1192.32. I have purchased the future/call option/stock and a time where I am saving cost relative to the theoretical value of all the assets.

The portfolio should be worth more than it is.

Natural Gas, (NGJ9P 2.60)(GKJ9C 2.70)(COALINDIA)

Probability Distributions

Price Movement Probability



Price Movement Probability

The minimum value the simulator returned for the underlying is $1.7111 and the maximum value is $4.1620.

The underlying price is 2.674, the mean rests above this price at 2.6860 which shows there is a higher probability that the price of Natural Gas is going to increase. The standard deviation, $0.3124 is relatively small and there is a 90% chance that the underlying price is going to fall within 2 standard deviations of the current price.

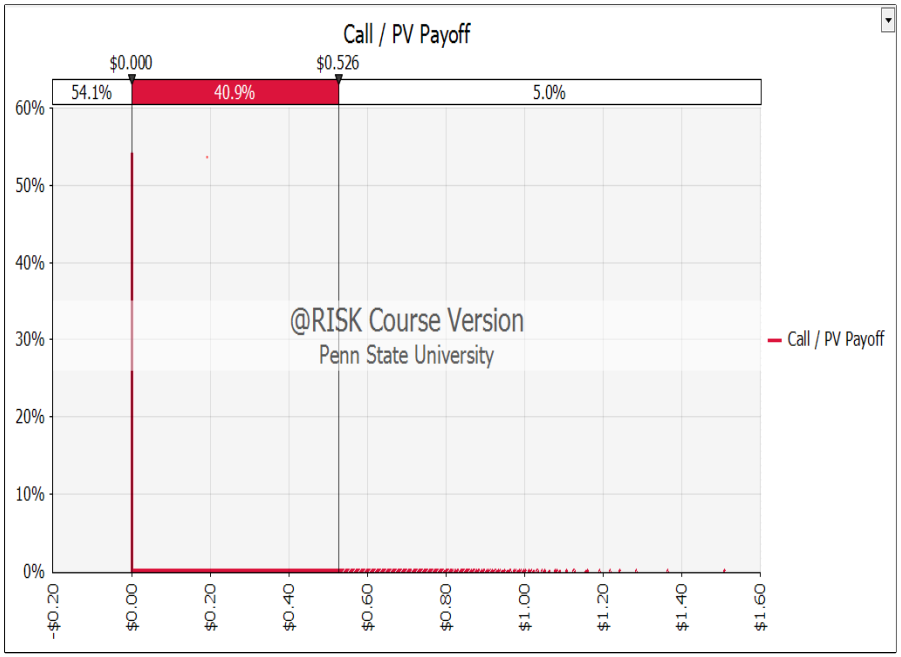
This graph is bad for my pitch because it shows that the underlying is more likely to increase when my pitch needs the underlying to decrease to at least to $2.60 or below (which has a ~40% chance of happening).

Natural Gas, (NGJ9P 2.60)(GKJ9C 2.70)(COALINDIA)

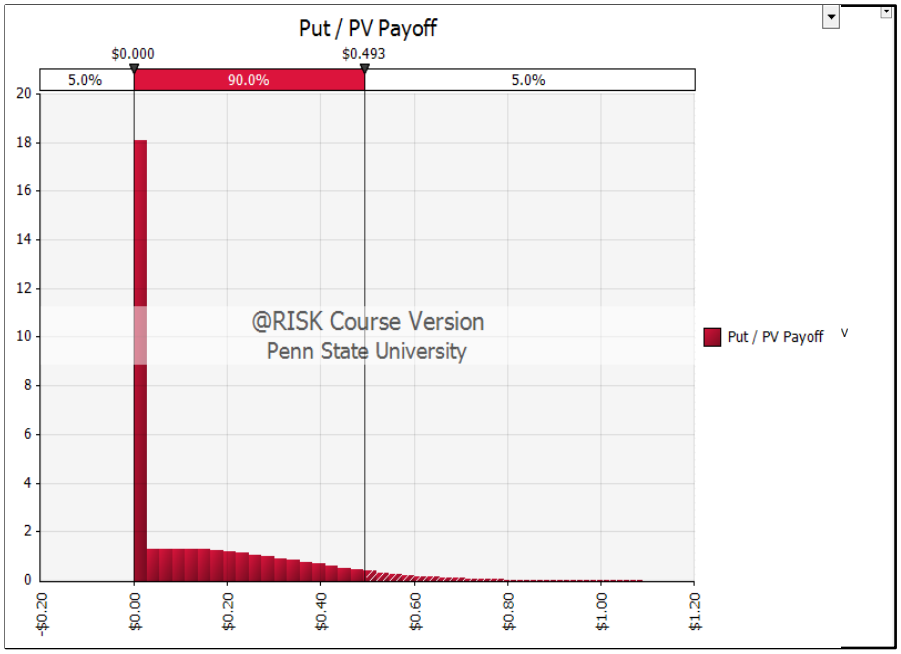
Probability Distributions

	PV Payoff	MV Valuation	MV Min	MV Max	MV STD	Iterations
Call	$ -	$ 0.12	$ -	$ 1.51	$ 0.19	10,000
Put	$ 0.03	$ 0.13	$ -	$ 1.04	$ 0.17	10,000

Call PV Payoff Diagram



Put PV Payoff Diagram



The market consensus is that the price is going to increase which shows undervalued objects in the negative price movement area. I want more red in the Put PV Payoff Diagram.

Natural Gas, (NGJ9P 2.60)(GKJ9C 2.70)(COALINDIA)

Product Drivers

Product Drivers

Driver #1
I chose natural gas as my commodity because recently there has been a lot of news about new supply investment both in the USA and abroad. Because of the cyclicality of natural gas demand, it makes it slightly easier to forecast demand and naturally hedges against increased demand producing a higher price. Additionally, as companies scramble to supply all time high demand levels, we see them driven towards the clean energy solution as a viable investment for years to come. Extreme volatility in natural gas makes the price more expensive; however, I countered this with a European option to lower the price.

Driver #2
Natural Gas is trading in contango meaning it's trading at a premium to the spot price and as it approaches expiration the premium approaches zero. The market is expecting the price of natural gas to decrease over time. This made my future call option hedge less expensive; however, it also increased the premium for my future contract.

Driver #3
Coal companies are struggling to reach profitability as increased costs (due to regulation) and lowered demand are forcing them to struggle. India's demand has been rapidly increasing and supply has been able to overshoot the demand in the last 8 months. This has caused the price of coal to decrease to $91. Profitability for Coal India LTD will cause a temporary surge to their stock price. Coal India LTD is currently forecasted to overshoot revenue by over 14%. If they reach this forecast we can expect the stock price to rise as I do not believe it is fully priced into the market. We saw a 3.6% increase in stock price on February 7th when the forecast was disclosed.

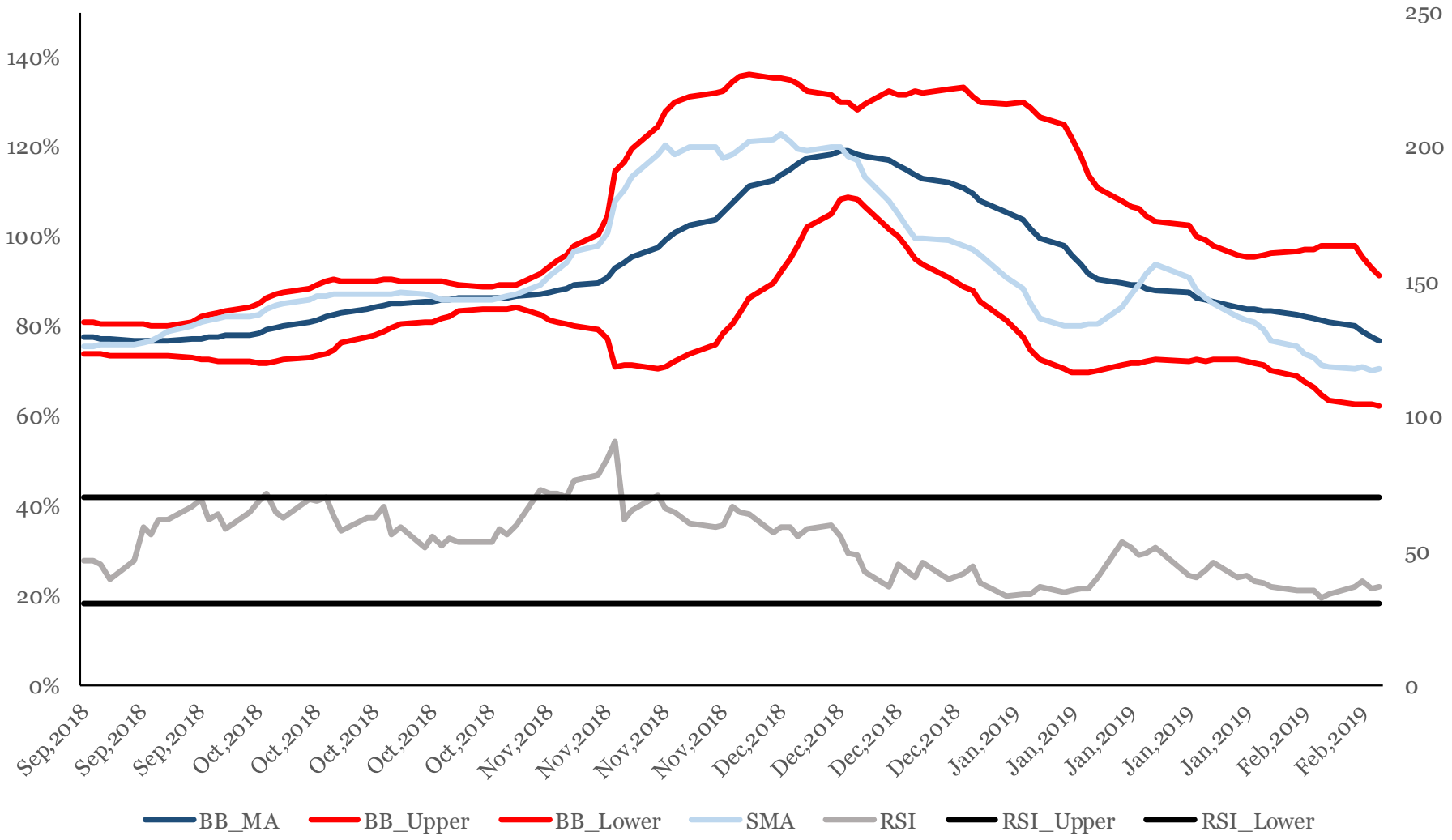
Contango Graph

Product Pros & Cons

- ✓ Trading in a contango market shows consensus that the price of natural gas is going to decrease over time (futures contract price increased).
- ✓ Supply growth for Natural Gas production has been steady over the last year in the United States.
- ✗ UK E-On artificially raising gas/electric prices 10% on April 1st. This may cause increased demand from other sources.
- ✗ Baker Hughes reported that 3 rigs were shut down bringing total to 195. Comparably still up 6% from last year though. Companies are trying to raise the price.

IV. Technical Analysis

Natural Gas Technical Analysis



V. Risk Analysis

Natural Gas, (NGJ9P 2.60)(GKJ9C 2.70)(COALINDIA)

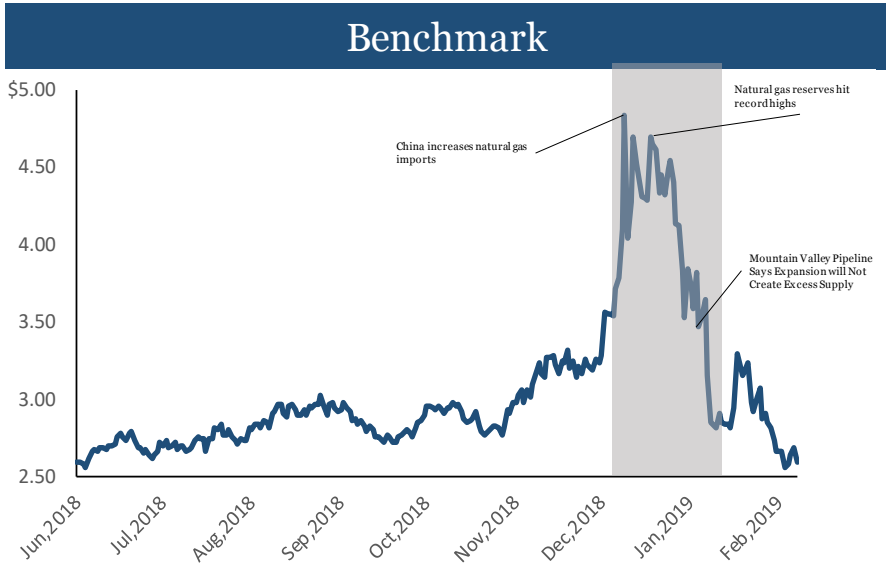
Risk Analysis

Major Risks

Potential Risks Here

- India Coal LTD Q3 earnings report is being released on February 12th, 2019. Position is betting on continued or worse than forecasted earnings. Revenue is expected to grow due to higher FSA realizations. Expectations are based at 14%, however, being priced into the market, if the earnings are lower than expected than the share price will fall.
- Baker Hughes reported that the international rig count for January 2019 is down 2 from December. Low Natural Gas prices are forcing companies to shut down drilling. Although, the international offshore rig count is up 7 from December.

Historical Movements Data



Physical Data

VI. Capital Allocation