

# The energy portfolio management finance essay

[Finance](#)



**ASSIGN  
BUSTER**

MBA (Energy Trading)

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## **MBA (Energy Trading)**

**2011-2013**

**upes\_logo1**

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MARCH, 2013

## **Certificate of Originality**

This is to hereby state with the intention of this report is very original in every sense of the terms and conditions and it carries a sense of honour and belief and that no shortcuts have been taken and I remained both meticulous and caring during the prevalence of this research work. I have put in my point best to keep this work as informative and precise as possible. It may be also stated here that during the preparation of this report some help has been taken from a scope of professionally shared information & knowledge, a comprehensive description of which has been mention in the references chapter of this report. Dated: Signature:

<https://assignbuster.com/the-energy-portfolio-management-finance-essay/>

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**Acknowledgement**

I acknowledge with thanks the help, guidance and the support that I have received during research work. I express deep sense of gratitude to Assistant Prof. Saumya Sharma, for her enormous help and valuable guidance and suggestion during the research work. I must also thank Mr. Shailendra Pokhriyal, Head of Department, Energy Trading, COMES, UPES for his cooperation and suggestion which enabled me carry out this research work in a better manner. Siddharth saxena

**MBA (Energy Trading),**

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**Uttarakhand**

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**STATEMENT OF THE PROPOSAL****PROBLEM STATEMENT**

" ENERGY PORTFOLIO MANAGEMENT" - is the research work that aims of creating a dynamic portfolio management process with analyzing all the risks that are related with the energy portfolio and how they impact the valuation of the same. It is aimed to provide best immunity to the portfolio from the known risks.

## BACKGROUND

The term " portfolio management" has a long history in the finance and investment. Under that name and others, the same risk management concepts and techniques have long been applied to procurement of commodities, including energy utility procurement of fuels and purchased power. In recent years, the term has begun to be used in the energy industry to describe actual or suggested approaches to default service resource management and trading in business that have restructured energy industry. However, application of portfolio management concepts need not be confined to energy deficient markets. Energy portfolio management helps utilities like cost-efficiently procure energy by tracking changes in market behavior and consumption, changes in suppliers in deregulated markets, market price volatility, and supply risk. Study also addresses a high-value; cost-effective solution that can reduce risk and provide solid return on investment. Energy portfolio management is a comprehensive study for management of sales and procurement portfolios in the energy industry or energy-intensive companies. OBJECTIVES The following are the key objectives of the topic: Price volatility which is tolerable for trader, taking into account the means at their disposal for managing that risk? How portfolio depends on the level and instability of prices? Timeframe for which the proposed strategy apply? What stability level of prices is expected to result during that time? How sensitive is the expected level? What flexibility is available and what point of timeframe

## **SCOPE OF RESEARCH**

This dissertation would include various risks which can occur while managing a energy profile. The time duration for collection and analysis of data would be factor that should be most relevant and help provide much needed immunity to the portfolio. This work would be done for energy sector and specially designed model for current valuation of assert i. e. portfolio.

## **RESEARCH METHODOLOGY**

**RESEARCH DESIGN**The research is descriptive as well as imperial as it will be conducted on the basis earlier research that has been conducted in this area of risk. Insights form market professionals would be obtain to know the "Ground Realities" of the risks involved and existing valuation models.

**SOURCE OF DATA**This research will be based on Secondary data collected from  
1. Journals  
2. Industry Professionals  
3. Past Data models

## **STATISTICAL/MATHEMATICAL TOOLS**

Lattice model  
Binomial option pricing model  
Local volatility  
Monte Carlo method for option pricing  
Valuation of option  
Fourier analysis  
Taylor analysis  
Bernoulli process  
Markov chain  
Stochastic process  
Geometric Brownian motion  
Stochastic volatility

## **PRICING THEORY**

Dynamics-Free Pricing  
Pricing Under Bernoulli Dynamics  
Black-Scholes Dynamics  
American Options and ' Exotics'  
Models with Uncertain Volatility  
Discontinuous Processes  
Interest-Rate Dynamics

## **INTRODUCTION**

In energy portfolios across the hedge funds it is generally observed to have much concentration on the crude oil or other petroleum products. To mitigate this exposes and divide across the energy spectrum we have taken crude oil , natural gas, coal and propane as commodities , this will help us understand the overall measures and implications across the energy sector. Energy portfolio is affected by number of attributes which goes around the whole spectrum that is petroleum products and other energy products . this explains the exposes and relative instability in the system . this intern affects the portfolio returns and its growth.

## **UNITS**

Dollars per Barrel for crude oil. Dollars per Thousand Cubic Feet for natural gas. US Dollars per Metric Ton for coal. Dollars per Gallon for propane.

## **TIME FRAME**

The time frame taken is a span of five years taking average of each month prices.

## **Europe Brent Spot Price FOB**

### **(Dollars per Barrel)**

YEARJANFEBMARAPRMAYJUNJULAUGSEPOCTNOVDEC200892. 1894. 99103.  
64109. 07122. 8132. 32132. 72113. 2497. 2371. 5852. 4539. 95200943.  
4443. 3246. 5450. 1857. 368. 6164. 4472. 5167. 6572. 7776. 6674.  
46201076. 1773. 7578. 8384. 8275. 9574. 7675. 5877. 0477. 8482. 6785.  
2891. 45201196. 52103. 72114. 64123. 26114. 99113. 83116. 97110.

22112. 83109. 55110. 77107. 872012110. 69119. 33125. 45119. 75110.  
3495. 16102. 62113. 36112. 86111. 71109. 06109. 49

### **Price of U. S. Natural Gas LNG Imports (Dollars per Thousand Cubic Feet)**

YearJanFebMarAprMayJunJulAugSepOctNovDec20088. 429. 379. 419. 8511.  
3312. 3412. 9910. 259. 069. 168. 098. 8620097. 636. 826. 344. 23. 883.  
894. 213. 943. 353. 954. 254. 6320100. 785. 744. 874. 254. 244. 24. 84.  
934. 64. 785. 095. 4120115. 564. 995. 355. 424. 636. 665. 56. 994. 487.  
414. 25. 5720124. 254. 32. 952. 964. 373. 15. 154. 023. 173. 187. 215. 22

### **COAL, SOUTH AFRICAN EXPORT PRICE**

#### **US Dollars per Metric Ton**

YearJanFebMarAprMayJunJulAugSepOctNovDec2008

115111108. 75120. 7142. 38167. 75156. 9147. 75109. 789. 3877.  
25200976. 469. 0658. 5662. 8858. 0360. 261. 164. 2561. 1364. 3566. 4473.  
8201086. 9483. 3682. 9688. 790. 9492. 8190. 6187. 985. 8290. 99103.  
2115. 242011122. 62117. 74121124. 03120. 46119. 01116. 27118. 27115.  
62110. 88105. 47104. 192012106. 26105. 3103. 43101. 3393. 7785. 3187.  
3389. 1185. 8282. 885. 7488. 84

### **Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)**

YearJanFebMarAprMayJunJulAugSepOctNovDec20080. 5061. 4251. 4751.  
591. 71. 8131. 8621. 6511. 531. 0450. 7380. 6120090. 7270. 6590. 6530.  
6380. 7010. 8460. 7520. 9060. 9461. 0081. 0761. 1920101. 3121. 2841.  
1361. 1371. 0821. 0371. 011. 0721. 1321. 2341. 2541. 29620111. 3481.

3791. 3971. 4541. 5211. 521. 5281. 5281. 561. 4721. 4581. 39520121.  
 2941. 221. 2611. 1960. 9540. 7880. 8740. 9010. 910. 9620. 890. 797

## **COEFFICIENT OF VARIATION (CV)**

This measure is the ratio of the distribution's standard deviation to its mean. It is one way to measure risk relative to return, or in such cases, variation in price relative to mean price, measured over a define period. Tolerance bands can be established around coefficient of variation (William Steinhurst, 2006)To calculate coefficient of variation we will require percentage change per month. corrsponding tabel is given in annexture A.

CALCULATIONEurope Brent Spot Price FOB (Dollars per Barrel)

### **Coefficient of variation**

#### **STANDARD DEVIATION IN SPOT**

24. 43969

#### **STANDARD DEVIATION IN % CHANGE**

0. 093408

#### **MEAN(AVERAGE)**

92. 153

#### **MEAN(AVERAGE)**

0. 01

#### **COFFICIENT OF VARIATION**

0. 265208



## **COFFICIENT OF VARIATION**

12. 39Price of U. S. Natural Gas LNG Imports (Dollars per Thousand Cubic Feet)

**Coefficient of variation**

## **STANDARD DEVIATION IN SPOT**

2. 483838

## **STANDARD DEVIATION IN % CHANGE**

0. 877858

## **MEAN(AVERAGE)**

5. 775833

## **MEAN(AVERAGE)**

0. 11

## **COFFICIENT OF VARIATION**

0. 43004

## **COFFICIENT OF VARIATION**

7. 878703Coal, South African export price, US Dollars per Metric Ton

**Coefficient of variation**

## **STANDARD DEVIATION IN SPOT**

24. 62738

## **STANDARD DEVIATION IN % CHANGE**

0. 08187

**MEAN(AVERAGE)**

97.16661

**MEAN(AVERAGE)**

-0.0011

**COEFFICIENT OF VARIATION**

0.253455

**COEFFICIENT OF VARIATION**

-77.1 Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)

**Coefficient of variation**

**STANDARD DEVIATION IN SPOT**

0.329396

**STANDARD DEVIATION IN % CHANGE**

0.257909

**MEAN(AVERAGE)**

1.160667

**MEAN(AVERAGE)**

0.86

**COEFFICIENT OF VARIATION**

0.283799

**COEFFICIENT OF VARIATION**

0.301347

## **INFERENCE**

The coefficient of variation value of spot price of natural gas is 0.4 which is more than the other energy forms across the same time spectrum which is around 0.25, thus we can deduce that the risk related to return is substantially high than other energy forms (for given time period)

## **BETA**

Beta is a measure of the systematic risk of a single instrument or an entire Portfolio and describes the sensitivity of an instrument or portfolio to broad market movements. A portfolio with a large beta will tend to benefit or suffer from broad market moves more strongly than the market overall, while one with a small beta will swing less violently than the broad market. (William Steinhurst, 2006) Here to get close correspondence of the market fluctuation the benchmark index taken is "Commodity Fuel (energy) Index" which is defined as Commodity Fuel (energy) Index, 2005 = 100, includes Crude oil (petroleum), Natural Gas, and Coal Price Indices (IMF). The calculation of beta is done by the regression which is given by the division of the covariance of the two arrays in the system by the variance of the benchmark index here it is taken as Commodity Fuel (energy) Index. All the four products percentage change in prices is taken against corresponding change in fuel price index.

## **CALCULATION**

Europe Brent Spot Price FOB (Dollars per Barrel)

## **COVARIANCE**

**0. 007275**

## **VARIANCE**

0. 006409

## **BETA**

1. 135094Price of U. S. Natural Gas LNG Imports (Dollars per Thousand Cubic Feet)

## **COVARIANCE**

**-0. 00475**

## **VARIANCE**

0. 006409

## **BETA**

-0. 74036Coal, South African export price, US Dollars per Metric Ton

## **COVARIANCE**

**0. 003902**

## **VARIANCE**

0. 006409

## **BETA**

0. 608893Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)

## **COVARIANCE**

**0. 006342**

## **VARIANCE**

0. 006409

## **BETA**

0. 989531

## **INFERENCE**

Beta corresponds to the systematic risk and correlation of each instrument with respect to the index. Here the value of Europe Brent Spot Price FOB that is 1. 2 which relates to the index. Contrarily the U. S. Natural Gas LNG Imports gives negative value deducing that on every move in the index there will be opposite move of slightly less intensity on the natural gas prices.

## **RELEABILITY TEST**

To test the reliability of the beta value special R - SQUARE test is done which corresponds to the accuracy and efficient calculation mechanism.

## **R - SQUARE**

### **R – SQUARE(Europe Brent Spot Price FOB)**

96. 41%

### **R - SQUARE(U. S. Natural Gas LNG Imports)**

0. 46%

### **R - SQUARE(Coal, South African export price)**

36. 71%

## **R - SQUARE(Mont Belvieu, TX Propane Spot Price)**

61. 77% This clearly shows Europe Brent Spot Price FOB mostly corresponds to the index in subject and the U. S. Natural Gas LNG does not correspond to the index at all.

## **EXTREME VALUE MEASURES**

This measures the portfolio riskiness. In general, this type of measure is the difference in cost between a portfolio's expected cost and some estimate of its worst-case cost. This measure portfolio riskiness by the difference between its expected cost and average of the worst 10% of its cost's probability distribution. (NorthWestern Energy 2005 Electric Default Supply Resource Procurement Plan, 2005) In this study of portfolio management the extreme value measure corresponds to mean value, standard deviation, skewness, kurtosis, r square and Engle 1. To calculate all the four commodities are evaluated for corresponding given parameters. Here the for R square and Engle 1 calculation commodities are evaluated with corresponding Commodity Fuel (energy) Index. For the calculation of R square the correlation coefficient for given data is deduced. Further the product of this coefficient with the sample size gives the value of Engle 1.

## **CALCULATION**

Europe Brent Spot Price FOB (Dollars per Barrel)

**mean**

**92. 153**

**standard deviation**

24. 43969

**skewness**

-0.42049

**kitrous**

-0.7916

**r square**

0.976206

**sample size**

59

**engle 1**

57.59614 Price of U. S. Natural Gas LNG Imports (Dollar/ Thousand Cubic Feet)

**mean**

**5.775833**

**standard deviation**

2.483838

**skewness**

1.048503

**kitrous**

0.799302

**r square**

0.081253

### **sample size**

59

### **engle 1**

4. 79391Coal, South African export price, US Dollars per Metric Ton

### **mean**

**97.16661**

### **standard deviation**

24.62738

### **skewness**

0.540404

### **kitrous**

0.33489

### **r square**

0.62669

### **sample size**

59

### **engle 1**

36. 9747Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)



**mean**

**1. 160667**

**standard deviation**

0. 329396

**skewness**

0. 01812

**kitrous**

-0. 82808

**r square**

0. 586967

**sample size**

59

**engle 1**

34. 63103

**INFERENCE**

Combined table

**Brent****ng****coal****propane****mean**

92. 1535. 7797. 1661. 16

**standard deviation**

24. 432. 4824. 60. 32

**skewness**

0. 421. 040. 540. 018

**kitrous**

-0. 790. 790. 33-0. 828

**r square**

0. 970. 0810. 620. 586

**sample size**

59595959

**engle 1**

57. 594. 7936. 9734. 63 INTERPRETATION (taking all commodities of equal proportions) The average of all four mean is 49. 06, this corresponds to the minimum value of the portfolio that can be possible with all four commodities doing worse corresponding to the fuel index. The average of skewness is around 0. 5 which means that the mostly the return achieved by

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the portfolio is underperforming by fifty percent. Kitrous is significantly low and positive for natural gas and coal but just opposite for crude and propane. Thus indicating that the index is related to the portfolio. Engle 1 value of natural gas is significantly low indicating low heteroskedasticity. Same is significantly high for all other commodities.

## **VALUE AT RISK (VAR)**

A traditional approach for quantifying risk of investment portfolios. VaR measures the downside risk of a portfolio. It is always calculated in the context of a risk level and a planning horizon. VaR of a proposed resource portfolio over a one year planning horizon at the 99% risk level. That VaR would tell us the amount of extra cost that would have a 1% chance of occurring over the next year. (William Steinhurst, 2006) In this study all the commodities are evaluated for VaR analysis

## **CALCULATION**

Europe Brent Spot Price FOB (Dollars per Barrel)

## **PARAMETER SPOT**

## **PARAMETER(% CHANGE)**

## **PORTFOLIO VALUE**

100PORTFOLIO VALUE100

## **AVERAGE RETURN SPOT**

21. 07103AVERAGE RETURN % CHANGE0. 069167

## **STANDARD DEVIATION IN SPOT**

24. 43969STANDARD DEVIATION IN SPOT0. 093408

## **CONFIDENCE LEVEL**

0.95 CONFIDENCE LEVEL 0.95

## **CALCULATION**

CALCULATION

## **MINIMUM RETURN WITH 95 % PROB**

-19.1287 MINIMUM RETURN WITH 95 % PROB -0.08448

## **VALUE OF PORTFOLIO**

-1812.87 VALUE OF PORTFOLIO 91.5524

## **VALUE AT RISK**

1912.87 VALUE AT RISK 8.447596 Price of U. S. Natural Gas LNG Imports

(Dollar/ Thousand Cubic Feet)

## **PARAMETER (SPOT)**

## **PARAMETER (% CHANGE)**

## **PORTFOLIO VALUE**

100 PORTFOLIO VALUE 100

## **AVERAGE RETURN SPOT**

1.948306 AVERAGE RETURN % CHANGE 0.328863

## **STANDARD DEVIATION IN SPOT**

2.483838 STANDARD DEVIATION IN SPOT 0.877858

## **CONFIDENCE LEVEL**

0.95 CONFIDENCE LEVEL 0.95

## **CALCULATION**

CALCULATION

## **MINIMUM RETURN WITH 95 % PROB**

-2. 13724MINIMUM RETURN WITH 95 % PROB-1. 11508

## **VALUE OF PORTFOLIO**

-113. 724VALUE OF PORTFOLIO-11. 5084

## **VALUE AT RISK**

213. 7245VALUE AT RISK111. 5084Coal, South African export price, US

Dollars per Metric Ton

## **PARAMETER (SPOT)**

## **PARAMETER(% CHANGE)**

## **PORTFOLIO VALUE**

100PORTFOLIO VALUE100

## **AVERAGE RETURN SPOT**

19. 88988AVERAGE RETURN % CHANGE0. 06009

## **STANDARD DEVIATION IN SPOT**

24. 62738STANDARD DEVIATION IN %CHANGE0. 08187

## **CONFIDENCE LEVEL**

0. 95CONFIDENCE LEVEL0. 95

## **CALCULATION**

CALCULATION

## **MINIMUM RETURN WITH 95 % PROB**

-20. 6186MINIMUM RETURN WITH 95 % PROB-0. 0746

## **VALUE OF PORTFOLIO**

-1961. 86VALUE OF PORTFOLIO92. 5426

## **VALUE AT RISK**

2061. 856VALUE AT RISK7. 45736Mont Belvieu, TX Propane Spot Price FOB  
(Dollars per Gallon)

## **PARAMETER (SPOT)**

## **PARAMETER(% CHANGE)**

## **PORTFOLIO VALUE**

100PORTFOLIO VALUE100

## **AVERAGE RETURN SPOT**

0. 277567AVERAGE RETURN % CHANGE0. 104765

## **STANDARD DEVIATION IN SPOT**

0. 329396STANDARD DEVIATION IN SPOT0. 257909

## **CONFIDENCE LEVEL**

0. 95CONFIDENCE LEVEL0. 95

## **CALCULATION**

CALCULATION

## **MINIMUM RETURN WITH 95 % PROB**

-0. 26424MINIMUM RETURN WITH 95 % PROB-0. 31946

## **VALUE OF PORTFOLIO**

73. 57591VALUE OF PORTFOLIO68. 05417

## **VALUE AT RISK**

26. 42409VALUE AT RISK31. 94583

## **INFERENCE**

The value at risk calculated for all four commodities in separate analysis at the spot price as well as on the percentage change of the spot prices. The confidence level taken is 95% as the time spectrum is of five years. The VaR value for the percentage change taken is more relevant if correlated with the fuel index thus in percentage change calculation natural gas is the most venerable commodity and others are also quite venerable if invested independently. VaR analysis shows the riskiness in investing in any one of these commodities independently and forming a portfolio will be a wise option.

## **REVENUE AT RISK (RAR)**

Because of the cost uncertainty of that resource, they have Revenue at Risk (RaR). RaR is equal to the maximum amount of extra resource cost that the manufacturer can afford to pay without severe damage to its finances.

(William Steinhurst, 2006)For our study RaR is a function of the direct impact of the market fluctuations. To measure this if the change in the percentage impact is either greater than ten percent or less than ten percent is noted and analysis is done on the only those values. Thus giving the actual risk related to the revenue and its implication.

## **CALCULATION**

Europe Brent Spot Price FOB (Dollars per Barrel)

### **MONTH**

#### **Spot Price**

#### **% CHANGE**

#### **MAY, 08**

122.812.59%

#### **AUG, 08**

113.2414.68%

#### **SEP, 08**

97.23-14.14%

#### **OCT, 08**

71.58-26.38%

#### **NOV, 08**

52.45-26.73%

#### **DEC, 08**

39.95-23.83%

#### **MAY, 09**

57.343.43%

#### **JUN, 09**

68.6119.74%



## **AUG, 09**

72. 5112. 52%

## **MAY, 10**

75. 9510. 46%

## **MAR, 11**

114. 6410. 53%

## **JUN, 12**

95. 1613. 76%

## **AUG, 12**

113. 3610. 47%Calculation

## **PARAMETER SPOT**

## **PORTFOLIO VALUE**

100

## **AVERAGE RETURN SPOT**

23. 25337

## **STANDARD DEVIATION IN SPOT**

26. 92094

## **CONFIDENCE LEVEL**

0. 95

## **CALCULATION**

### **MINIMUM RETURN WITH 95 % PROB**

-21.0276

### **VALUE OF PORTFOLIO**

-2002.76

### **REVENUE AT RISK**

2102.764 Price of U. S. Natural Gas LNG Imports (Dollar/ Thousand Cubic Feet)

### **MONTH**

### **SPOT PRICE**

### **% CHANGE**

### **FEB, 08**

9.3711.28%

### **MAY, 08**

11.3315.03%

### **AUG, 08**

10.2521.09%

### **SEP, 08**

9.06-11.61%

### **NOV, 08**

8.0911.68%

## **JAN, 09**

7. 6313. 88%

## **FEB, 09**

6. 82-10. 62%

## **APR, 09**

4. 233. 75%

## **SEP, 09**

3. 35-14. 97%

## **OCT, 09**

3. 9517. 91%

## **JAN, 10**

0. 78-80. 25%

## **FEB, 10**

5. 74635. 90%

## **MAR, 10**

4. 87-15. 16%

## **APR, 10**

4. 25-12. 73%

## **JUL, 10**

4. 814. 29%

## **FEB, 11**

4. 99-10. 25%

## **MAY, 11**

4. 6314. 58%

## **JUN, 11**

6. 6643. 84%

## **JUL, 11**

5. 5-17. 42%

## **AUG, 11**

6. 9927. 09%

## **SEP, 11**

4. 48-35. 91%

## **OCT, 11**

7. 4165. 40%

## **NOV, 11**

4. 2-43. 32%

## **DEC, 11**

5. 5732. 62%

## **JAN, 12**

4. 25-23. 70%

**MAR, 12**

2. 9531. 40%

**MAY, 12**

4. 3747. 64%

**JUN, 12**

3. 1-29. 06%

**JUL, 12**

5. 1566. 13%

**AUG, 12**

4. 02-21. 94%

**SEP, 12**

3. 17-21. 14%

**AUG, 12**

4. 0226. 81%

**SEP, 12**

3. 17-21. 14%

**NOV, 12**

7. 21126. 73%

**DEC, 12**

5. 22-27. 60%

## **PARAMETER SPOT**

### **PORTFOLIO VALUE**

100

### **AVERAGE RETURN SPOT**

1. 772

### **STANDARD DEVIATION IN SPOT**

2. 269332

### **CONFIDENCE LEVEL**

0. 95

## **CALCULATION**

### **MINIMUM RETURN WITH 95 % PROB**

-1. 96072

### **VALUE OF PORTFOLIO**

-96. 0719

### **REVENUE AT RISK**

196. 0719Coal, South African export price, US Dollars per Metric Ton

## **MONTH**

### **SPOT**

### **% CHANGE**

### **MAY, 08**

120. 710. 99%

**JUN, 08**

142.3817.96%

**JUL, 08**

167.7517.82%

**OCT, 08**

109.7-25.75%

**NOV, 08**

89.38-18.52%

**DEC, 08**

77.25-13.57%

**MAR, 09**

58.56-15.20%

**DEC, 09**

73.811.08%

**JAN, 10**

86.9417.80%

**NOV, 10**

103.213.42%

**DEC, 10**

115.2411.67%Calculation

## **PARAMETER SPOT**

### **PORTFOLIO VALUE**

100

### **AVERAGE RETURN SPOT**

24. 61107

### **STANDARD DEVIATION IN SPOT**

31. 89444

### **CONFIDENCE LEVEL**

0. 95

## **CALCULATION**

### **MINIMUM RETURN WITH 95 % PROB**

-27. 8506

### **VALUE OF PORTFOLIO**

-2685. 06

### **REVENUE AT RISK**

2785. 062Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)

## **MONTH**

### **SPOT**

### **% CHANGE**

### **FEB, 08**

1. 425181. 62%



## **AUG, 08**

1. 651-11. 33%

## **OCT, 08**

1. 045-31. 70%

## **NOV, 08**

0. 738-29. 38%

## **DEC, 08**

0. 61-17. 34%

## **JAN, 09**

0. 72719. 18%

## **JUN, 09**

0. 846-20. 68%

## **JUL, 09**

0. 752-11. 11%

## **AUG, 09**

0. 90620. 48%

## **DEC, 09**

1. 1910. 59%

## **JAN, 10**

1. 31210. 25%

## **MAR, 10**

1. 13611. 53%

## **MAY, 12**

0. 95420. 23%

## **JUN, 12**

0. 788-17. 40%

## **JUL, 12**

0. 87410. 91%

## **DEC, 12**

0. 79710. 45%Calculation

## **PARAMETER SPOT**

## **PORTFOLIO VALUE**

100

## **AVERAGE RETURN SPOT**

0. 231547

## **STANDARD DEVIATION IN SPOT**

0. 288443

## **CONFIDENCE LEVEL**

0. 95

## **CALCULATION**

### **MINIMUM RETURN WITH 95 % PROB**

-0. 2429

### **VALUE OF PORTFOLIO**

75. 71005

### **REVENUE AT RISK**

24. 28995

## **INFERENCE**

All the commodities are taken only for real fluctuations among all propane comes out to have minimum revenue at risk than come natural gas This corresponds that propane and natural gas both requires less purification when compared to other two and both are ready to use thus have much less exposes to market fluctuations. To add to this the market capitalizations for these two is also less to have such an impact.

## **LIQUIDATION VALUE AT RISK**

The total potential loss that could occur if an asset has to be liquidated. For instance, a fund might try to determine what would happen if it were forced to retire an unproductive asset. (William Steinhurst, 2006) For liquidation the confidence level taken has to be ten percent or less than ten percent this is done to make sure the least confidence on the asset and the liquidation value at risk.

## **CALCULATION**

Europe Brent Spot Price FOB (Dollars per Barrel)

<https://assignbuster.com/the-energy-portfolio-management-finance-essay/>

## **LIQUIDATION AT RISK**

### **PORTFOLIO VALUE**

100

### **AVERAGE RETURN SPOT**

21. 07103

### **STANDARD DEVIATION IN SPOT**

24. 43969

### **CONFIDENCE LEVEL**

0. 10

## **CALCULATION**

### **MINIMUM RETURN WITH 100 % PROB**

52. 39176

### **VALUE OF PORTFOLIO**

5339. 18

### **VALUE AT RISK**

-5239. 18Price of U. S. Natural Gas LNG Imports (Dollar/ Thousand Cubic Feet)

## **LIQUIDATION AT RISK**

### **PORTFOLIO VALUE**

100

## **AVERAGE RETURN SPOT**

1. 948306

## **STANDARD DEVIATION IN SPOT**

2. 483838

## **CONFIDENCE LEVEL**

0. 10

## **CALCULATION**

## **MINIMUM RETURN WITH 100 % PROB**

5. 131472

## **VALUE OF PORTFOLIO**

613. 15

## **VALUE AT RISK**

-513. 15Coal, South African export price, US Dollars per Metric Ton

## **LIQUIDATION AT RISK**

## **PORTFOLIO VALUE**

100

## **AVERAGE RETURN SPOT**

21. 01588

## **STANDARD DEVIATION IN SPOT**

27. 45148

## **CONFIDENCE LEVEL**

0.10

## **CALCULATION**

### **MINIMUM RETURN WITH 100 % PROB**

56.19638

## **VALUE OF PORTFOLIO**

5719.64

## **VALUE AT RISK**

-5619.64 Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)

## **LIQUIDATION VALUE AT RISK AT RISK**

## **PORTFOLIO VALUE**

100

## **AVERAGE RETURN SPOT**

0.277567

## **STANDARD DEVIATION IN SPOT**

0.329396

## **CONFIDENCE LEVEL**

0.10

## **CALCULATION**

### **MINIMUM RETURN WITH 100 % PROB**

0.699704

## **VALUE OF PORTFOLIO**

169. 97

## **VALUE AT RISK**

-69. 97

## **INFERENCE**

All the commodities are taken only for real liquidations, among all propane comes out to have minimum liquidation value at risk than come natural gas. This corresponds that propane and natural gas both requires less purification when compared to other two and both are ready to use thus have much less exposes to market liquidation. To add to this the market capitalizations for these two is also less to have such an impact.

## **COSTS AT RISK**

Cost-at-Risk (CaR) is a supplementary measure used in the management of the interest-rate risk on the domestic central-government debt. CaR quantifies the risk on the debt and gives important input to the weighing of interest-rate risk against costs. A distinction is made between absolute and relative CaR. Absolute CaR for a given year indicates the maximum costs with a probability of 95 per cent. Relative CaR is the difference between absolute CaR and the average interest costs. Relative CaR thus indicates the maximum increase in the costs for a given year, with a probability of 95 per cent. (Cost-at-Risk for the Domestic Debt, 2000) In our study the cost at risk is taken with respect to the Average majority prime rate charged by banks (US banks) . All the fluctuations and impacts are calculated annually in order

to get maximum exposure to the interest rates. The cost of procuring and trading a commodity is impacted by the interest rates largely.

## **CALCULATION**

Europe Brent Spot Price FOB (Dollars per Barrel)

### **calculation**

#### **spot price**

#### **MAX 08**

132.72

#### **PROBABILITY**

0.95

#### **ABSOLUTE COST AT RISK**

126.084

#### **MEAN 08**

96.8475

#### **RELATIVE COST AT RISK**

29.2365

#### **MAX 09**

76.66

#### **PROBABILITY**

0.95



## **ABSOLUTE COST AT RISK**

72. 827

## **MEAN 09**

61. 49

## **RELATIVE COST AT RISK**

11. 337

## **MAX 10**

91. 45

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

86. 8775

## **MEAN 10**

79. 511667

## **RELATIVE COST AT RISK**

7. 3658333

## **MAX 11**

123. 26

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

117.097

## **MEAN 11**

111.26417

## **RELATIVE COST AT RISK**

5.8328333

## **MAX 12**

125.45

## **PROBABILITY**

0.95

## **ABSOLUTE COST AT RISK**

119.1775

## **MEAN 12**

111.65167

## **RELATIVE COST AT RISK**

7.5258333Price of U. S. Natural Gas LNG Imports (Dollar/ Thousand Cubic Feet)

## **spot price**

## **MAX 08**

12.99

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

12. 3405

## **MEAN 08**

9. 9275

## **RELATIVE COST AT RISK**

2. 413

## **MAX 09**

7. 63

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

7. 2485

## **MEAN 09**

4. 7575

## **RELATIVE COST AT RISK**

2. 491

## **MAX 10**

5. 74

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

5. 453

## **MEAN 10**

4. 474167

## **RELATIVE COST AT RISK**

0. 978833

## **MAX 11**

7. 41

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

7. 0395

## **MEAN 11**

5. 563333

## **RELATIVE COST AT RISK**

1. 476167

## **MAX 12**

7. 21

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

6. 8495

## **MEAN 12**

4. 156667

## **RELATIVE COST AT RISK**

2. 692833Coal, South African export price, US Dollars per Metric Ton

## **spot price**

## **MAX 08**

167. 75

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

159. 3625

## **MEAN 08**

112. 2133

## **RELATIVE COST AT RISK**

47. 14917

## **MAX 09**

76. 4

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

72. 58

## **MEAN 09**

64. 68333

## **RELATIVE COST AT RISK**

7. 896667

## **MAX 10**

115. 24

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

109. 478

## **MEAN 10**

91. 6225

## **RELATIVE COST AT RISK**

17. 8555

## **MAX 11**

124. 03

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

117. 8285

## **MEAN 11**

116. 2967

## **RELATIVE COST AT RISK**

1. 531833

## **MAX 12**

106. 26

## **PROBABILITY**

0. 95

## **ABSOLUTE COST AT RISK**

100. 947

## **MEAN 12**

92. 92

## **RELATIVE COST AT RISK**

8. 027Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)

## **spot price**

## **max 08**

1. 862

**probability**

0. 95

**ABSOLUTE COST AT RISK**

1. 7689

**MEAN 08**

1. 32875

**RELATIVE COST AT RISK**

0. 44015

**max 09**

1. 19

**probability**

0. 95

**ABSOLUTE COST AT RISK**

1. 1305

**MEAN 08**

0. 841833

**RELATIVE COST AT RISK**

0. 288667

**max 10**

1. 312



**probability**

0. 95

**ABSOLUTE COST AT RISK**

1. 2464

**MEAN 08**

1. 1655

**RELATIVE COST AT RISK**

0. 0809

**max 11**

1. 56

**probability**

0. 95

**ABSOLUTE COST AT RISK**

1. 482

**MEAN 08**

1. 463333

**RELATIVE COST AT RISK**

0. 018667

**max 12**

1. 294

**probability**

0. 95

**ABSOLUTE COST AT RISK**

1. 2293

**MEAN 08**

1. 003917

**RELATIVE COST AT RISK**

0. 225383

**INFERENCE**

For all the years individually natural gas and propane have very less cost at risk when compared to other two commodities. This again proves that the more commodity is exposed in terms of market capitalization more is the chance of running into risk, realization is tough and immunity is weak. All those commodities namely here Brent and coal have higher cost at risk with respect to interest rate index.

**Volatility**

Measure of variation of the value of portfolio within a given time spectrum. This also shows the impact of random market fluctuation on the valuation. Due to impact on one asset the corresponding change in other asset and relative change in valuation. Volatility impact is calculated with respect to CBOE Volatility Index which is benchmark in volatility index. This will give relative exposure corresponds to each date. To calculate the implied volatility standard deviation of the stress impact of given index as well as the

spot prices are to be deduced. The correlation of the two values is deduced in order to get standard deviation.

## **CALCULATION**

Europe Brent Spot Price FOB (Dollars per Barrel)

### **standard deviation**

**6. 801573**

### **implied volatility**

2. 607983 Price of U. S. Natural Gas LNG Imports (Dollar/ Thousand Cubic Feet)

### **standard deviation**

**1. 048153**

### **implied volatility**

1. 023794 Coal, South African export price, US Dollars per Metric Ton

### **standard deviation**

**10. 80215**

### **implied volatility**

3. 286663 Mont Belvieu, TX Propane Spot Price FOB (Dollars per Gallon)

### **standard deviation**

**0. 114602**

### **implied volatility**

0. 338529

## INFERENCE

Coal and Brent have higher volatility with respect to the volatility index in consideration. The volatility in the market is impacting the commodities having more exposure to the market and are more venerable in nature.

## Valuation

**Based on black soles theory we can find the valuation of the portfolio . there are two main attributes of this theory these are preference free and risk neutral nature of portfolio . from this theory for our study we are adopting only risk neutral nature of portfolio. In this theory of valuation is based on the fact that assert price is lognormally proportional to the market as well as time spectrum**

**Taking binomial calculation for the current value of portfolio while taking the risk neutral nature of black soles model. For the calculation time frame taken is 5 years, value of portfolio ( assert) is taken 100 units, average riskless interest rate taken in the study is 3 %, market implication affecting the given portfolio is 10 % i. e. implied volatility**

**Thus if we will form binomial portfolio tree with 10% volatility, we will get**

**100**

90. 48 110. 5281. 87 100 122. 1474. 08 90. 48 110. 52 134. 9967. 03 81. 87

100 122. 14 149. 18 60. 65 74. 08 90. 48 110. 52 134. 99 164. 87