



UNIVERSITY OF PIRAEUS

Department of International & European Studies

MSc in Energy: Strategy, Law and Economics

Special Issues in energy finance & risk management

“Parametric Approach of VaR Calculation (or else Variance Covariance method)”

Sat, 28 nov 2020

The background of the slide features a blurred image of a business meeting in a modern office with large windows. Overlaid on the right side are two large, overlapping triangles: a red one pointing downwards and a blue one pointing upwards. The text is positioned on the left side of the slide.

VaR Calculation

Variance Covariance Method

Example

VaR of a Portfolio



Generally VaR will not be calculated for a single position, but for a portfolio of positions. In such a case the portfolio volatility is required.

The portfolio volatility of a n-asset portfolio is given by the following formula:

$$\sigma_P^2 = \sum_{i=1}^n \alpha_i^2 \sigma_i^2 + 2 \sum_{i=1}^n \sum_{i < j} \alpha_i \alpha_j \sigma_i \sigma_j \rho_{ij}$$

Where:

- σ = Standard Deviation
- α = Investment (per asset)
- ρ = Correlation

Assumptions for our Example



	Asset 1	Asset 2	Asset 3	
Step 1:	Standard Deviation	σ_1	σ_2	σ_3
		0,02	0,01	0,04
Step 2:	Correlation of Assets	ρ_{12}	ρ_{13}	ρ_{23}
		0,30	0,10	0,50

				Total Inv [EUR]	
Step 3:	Investment [EUR]	10.000.000,00	5.000.000,00	8.000.000,00	23.000.000,00
	Weighted Investment	w_1	w_2	w_3	
		0,43	0,22	0,35	

Variance Covariance Matrix



Construct the Variance Covariance Matrix

0,0004	0,0001	0,0001
0,0001	0,0001	0,0002
0,0001	0,0002	0,0016

Step 4.1: [variance = σ_v^2] (*colored cells*)

Step 4.2: [covariance = $\rho_{v\mu} \times \sigma_v \times \sigma_\mu$]

Value At Risk



Step 5: Calculation of Portfolio Variance

Step 6: Calculation of Portfolio STDEV [sqrt of Port. Variance]

Step 7: Portfolio Variance in **EUR** [Port. STDEV x Inv.]

Portfolio Variance & Port. STDV

	0,0003
	0,02
	423.910,37 EUR



Step 8: Value at Risk calculation

- Confidence Level @ 99%
- For 10 Days period

- Confidence Level @ 95%
- For 10 Days period



$$\text{VaR} = [2.33 \times 0,424 \times \sqrt{10}] = 3.12 \text{ mil€}$$



$$\text{VaR} = [1.65 \times 0,424 \times \sqrt{10}] = 2.21 \text{ mil€}$$



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We are.



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The founder & Owner:

- ***Ioannis Psarros**, Power Trader since 2008*

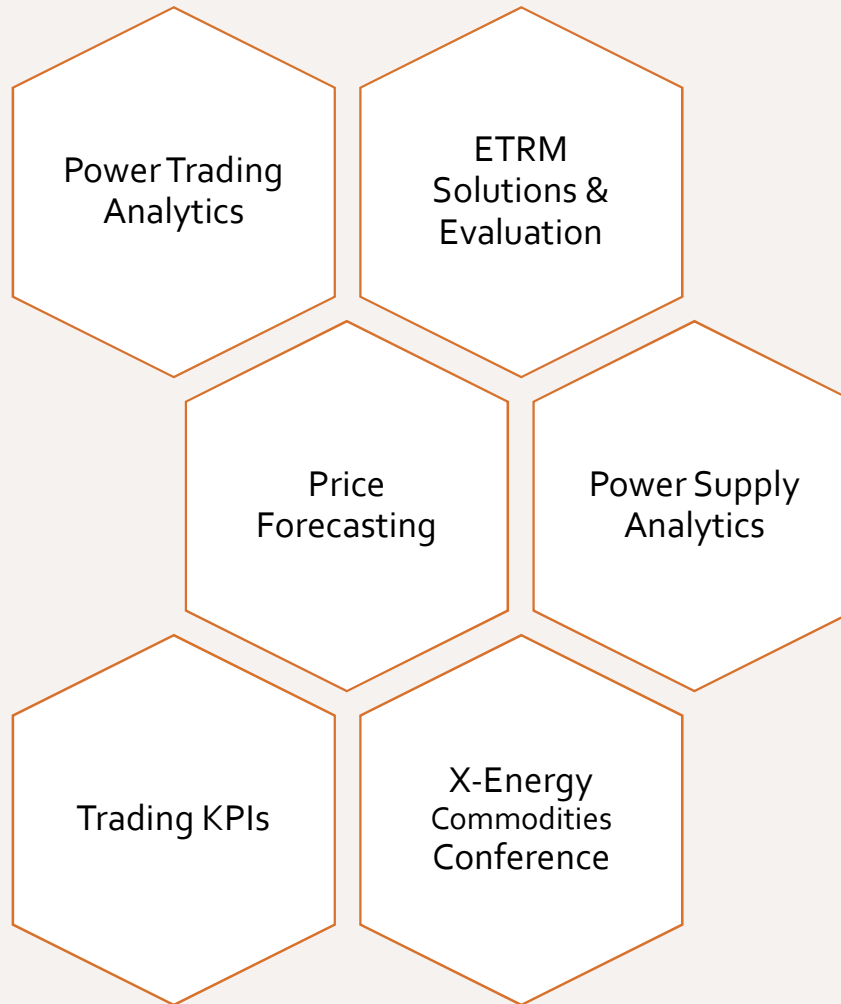
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A photograph of a business meeting in a modern office. In the foreground, a man in a brown suit and tie is pointing with a white marker towards a large window. In the background, several other business professionals are visible, some looking at a laptop. The office has large windows overlooking a city skyline. The image is overlaid with a red and orange geometric design consisting of triangles and lines.

We do.

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Thank you!

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Our Knowledge. Your Value.

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