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**تعیین میزان بهینه سرمایه گذاری در بازار بورس  
اوراق بهادار با رویکرد ارزش در معرض ریسک**

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ارزش در معرض ریسک، بهینه یابی مقید، خسارات نگران کننده

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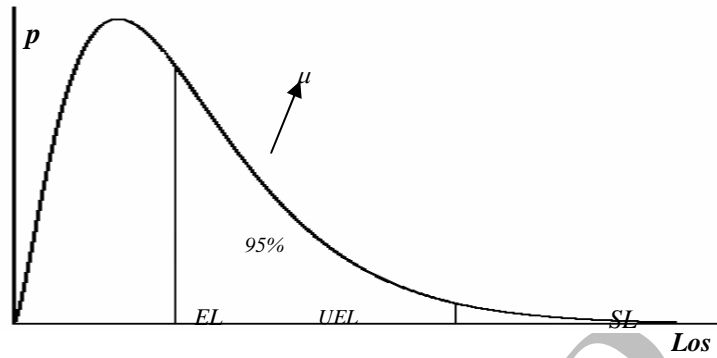
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$$P(Loss \leq VaR) = \int_0^{VaR} f(L)dL = 1 - \alpha \quad ( )$$

$$VaR_{1-\alpha} = F^{-1}(1 - \alpha) \quad ( )$$

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$$R = \frac{P_s - P_{s-1}}{P_{s-1}}$$

$$E(R_s) = \sum_{s=1}^S R_s P_s \quad s=1, \dots, S \quad ( )$$

$$\sigma_r^2 = \sum_{s=1}^S (r_s - E(R))^2 P_s$$

$$\left( \begin{matrix} R_s \\ \vdots \\ R_s \end{matrix} \right) \quad \left( \begin{matrix} \sigma_r^2 \\ E(R) \\ P_s \\ R_s \end{matrix} \right)$$

$$R_p = \sum_{i=1}^n w_i R_i \quad ( )$$

$$\left[ \begin{matrix} w_i \end{matrix} \right]$$

$$\sigma_p^2 = \sum_{i=1}^n w_i^2 \sigma_i^2 + \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_{ij} \quad i=1, \dots, n \quad ( )$$

$$\left( \begin{matrix} \sigma_{ij} \\ \vdots \\ \sigma_{ij} \end{matrix} \right) \quad \left( \begin{matrix} \sigma_p^2 \\ \vdots \\ \sigma_i^2 \end{matrix} \right)$$

$$\Omega = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \dots & \sigma_{1n} \\ \sigma_{21} & \sigma_2^2 & \dots & \sigma_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{n1} & \sigma_{n2} & \dots & \sigma_n^2 \end{bmatrix}$$

$$\sigma_p^2 = V' \Omega V \quad (1)$$

$$1 - \alpha = P(\Delta W \leq VaR) = 1 - \alpha \quad (2)$$

$$P(\Delta W \leq VaR) = 1 - \alpha \quad (3)$$

$$P\left(\left(\Delta W \sqrt{(V' \Omega V)}\right)^{-1} \leq VaR \left(\sqrt{(V' \Omega V)}\right)^{-1}\right) = 1 - \alpha \quad (4)$$

$$P\left(\left(\Delta W \sqrt{(V' \Omega V)}\right)^{-1} \leq VaR \left(\sqrt{(V' \Omega V)}\right)^{-1}\right) = F\left(VaR \left(\sqrt{(V' \Omega V)}\right)^{-1}\right) \quad (5)$$

$$F\left(VaR \left(\sqrt{(V' \Omega V)}\right)^{-1}\right) = 1 - \alpha \quad (6)$$

$$VaR = F^{-1}(1 - \alpha) \sqrt{(V' \Omega V)} \quad (7)$$

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$$ARIMA: r = \alpha_0 + \sum_{k=1}^n \alpha_k r_{t-k} + \sum_{z=1}^m \lambda_z \varepsilon_{t-z} + \varepsilon_t$$

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$$\sigma_t^2 = \beta_0 + \sum_{i=1}^p \beta_i \varepsilon_{t-i}^2 + u_t$$

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$$AR: \sum_{k=1}^n \alpha_k r_{t-k}, \quad MA: \sum_{z=1}^m \lambda_z \varepsilon_{t-z}$$



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$\varepsilon_t$

$$\sigma_t^2 = \beta_0 + \beta_1 \varepsilon_{t-1}^2 + u_t \quad ( )$$

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$$\text{GARCH}(q,p): \sigma_t^2 = \omega + \sum_{i=1}^p \beta_i \varepsilon_{t-i}^2 + \sum_{j=1}^q \gamma_j \sigma_{t-j}^2 + u_t \quad ( )$$

$$\text{GARCH}(1,1): \sigma_t^2 = \omega + \beta_1 \varepsilon_{t-1}^2 + \gamma_1 \sigma_{t-1}^2 + u_t \quad ( )$$

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$$\text{Min : VaR} = -z \sqrt{\sum_{i=1}^n W_i^2 \sigma_i^2 + \sum_{i=1}^n \sum_{j=1}^n W_i W_j \sigma_{ij}} \quad ( )$$

$$\text{S.t. : } \sum_{i=1}^n W_i = 1 \quad W_i \geq 0$$

$$L = \text{VaR} + \lambda_1 (1 - \sum_{i=1}^n W_i) - \lambda_2 W_i \quad ( )$$

$$\frac{\partial L}{\partial W_i} = -\frac{Z}{2} (2W_i \sigma_i^2 + W_j \sigma_{ij}) (\sigma_p^2)^{-\frac{1}{2}} - \lambda = 0$$

$$\frac{\partial L}{\partial \lambda_1} = 1 - \sum_{i=1}^n W_i = 0 \quad ( )$$

$$\frac{\partial L}{\partial \lambda_2} = W_i \geq 0 \Rightarrow \lambda_2 (W_i) = 0$$

$$.d^2L \geq 0 :$$

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$$\begin{vmatrix} 0 & \frac{\partial^2 L}{\partial \lambda_{w_1}} & \frac{\partial^2 L}{\partial \lambda_{w_n}} \\ \frac{\partial^2 L}{\partial \lambda_{w_1}} & VaR_{11} & Var_{1n} \\ \frac{\partial^2 L}{\partial \lambda_{w_n}} & VaR_{n1} & Var_{nn} \end{vmatrix} = |H| \leq 0$$

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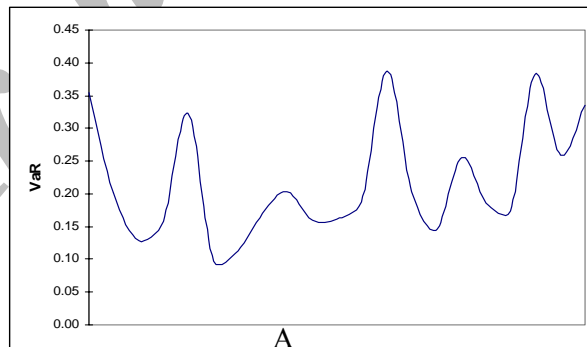
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9. Alexander, J. (1999). "Extreme Value Theory for Risk Managers", McNeil Department Mathematics, 2.
10. Engle, R. (1982). "Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of United Kingdom Inflation", *Econometrica*, Vol. 55.
11. Jorion, P. (2000). "Value at Risk", Mc Graw- Hill, pp: 205- 227, 708-720.
12. Patterson, K. (2002). "An Introduction to Applied Econometrics: A Time Series Approach".
13. Johri, S. (2004). "Portfolio Optimization with Hedge Funds", Swiss Federal Institute of Technology.
14. Huisman, R.; Koedijk, K. and Pownall, R. (1999). "Asset Allocation in A Value at Risk Framework", *Financial Management*.
15. Pavlo, K.; Jonas, P. and Stanislav, U. (2001). "Portfolio Optimization With Conditional Value- At- Risk Objective And Constraints", McKinsey & Company, Stockholm, Sweden.
16. Markowitz, H. M. (1959). "Portfolio Selection: Efficient Diversification of Investments", Wiley, New York.

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