**Report**

**Introduction**

The following report analyzes the Marginal Value at Risk (mVaR) for various sectors and individual tickers within a diversified portfolio. The mVaR provides insights into the incremental risk each sector and ticker contribute to the overall portfolio's Value at Risk (VaR). This analysis uses both parametric and historical methods to calculate the portfolio VaR.

**Portfolio VaR Calculation**

The total portfolio VaR was calculated using two different methods:

1. **Parametric Method**: -$2,053,996
2. **Historical Method**: -$2,576,477
3. **Monte Carlo Method**: -$2,067,942

These values indicate the potential maximum loss in the portfolio's value at a given confidence level, with the historical method yielding a higher risk estimate compared to the parametric method.

Sector-Level mVaR Analysis

|  |  |
| --- | --- |
| Sector | mVaR |
| Basic Material | -0.023679 |
| Communication Services | - 0.017924 |
| Consumer Cyclical | -0.022721 |
| Financial Services | -0.016115 |
| Healthcare | -0.020883 |
| Technology | -0.061365 |
| Utilities | -0.004760 |

**Observations:**

* The **Technology** sector exhibits the highest mVaR (-0.061365), suggesting that it provides the greatest risk diversification benefit within the portfolio.
* The **Utilities** sector shows the lowest mVaR (-0.004760), indicating a minimal impact on reducing portfolio risk.
* Other sectors such as **Basic Materials**, **Consumer Cyclical**, and **Healthcare** also contribute significantly to risk diversification

**Ticker-Level mVaR Analysis**

The table below presents the mVaR values for individual tickers along with their corresponding sectors:

|  |  |  |
| --- | --- | --- |
| **Ticker** | **mVaR** | **sector** |
| ADI | -0.02518 | Technology |
| APD | -0.02478 | Basic Materials |
| CLVT | -0.26428 | Technology |
| DIS | -0.02154 | Communication Services |
| GOOGL | -0.02404 | Communication Services |
| IFF | -0.02101 | Basic Materials |
| KLAC | -0.02778 | Technology |
| LOW | -0.02476 | Consumer Cyclical |
| MDT | -0.01597 | Healthcare |
| NTES | -0.0201 | Communication Services |
| NXPI | -0.02668 | Technology |
| SAP | -0.02387 | Technology |
| SCHW | -0.01875 | Financial Services |
| SONY | -0.0185 | Technology |
| TEL | -0.02375 | Technology |
| UNH | -0.0259 | Healthcare |
| WFC | -0.01413 | Financial Services |
| WMG | -0.00486 | Communication Services |
| XEL | -0.00476 | Utilities |
| YUM | -0.02055 | Consumer Cyclical |

**Observations:**

* **CLVT (Technology)** has the most significant mVaR (-0.264275), indicating it contributes substantially to reducing overall portfolio risk.
* **WMG (Communication Services)** and **XEL (Utilities)** have the lowest mVaR values, suggesting limited impact on risk reduction.
* Most of the tickers in the **Technology** sector show high negative mVaR values, reinforcing the sector-level observation that technology stocks are significant diversifiers.

**Conclusion**

The analysis demonstrates that both sector and ticker-level mVaR provide valuable insights into the risk contribution of individual components within a portfolio. The **Technology** sector, and specific tickers such as **CLVT**, offer substantial diversification benefits. This information is crucial for portfolio optimization, enabling better risk management and strategic asset allocation.

Further, the differences between parametric and historical VaR estimates highlight the importance of using multiple methods to understand portfolio risk comprehensively.