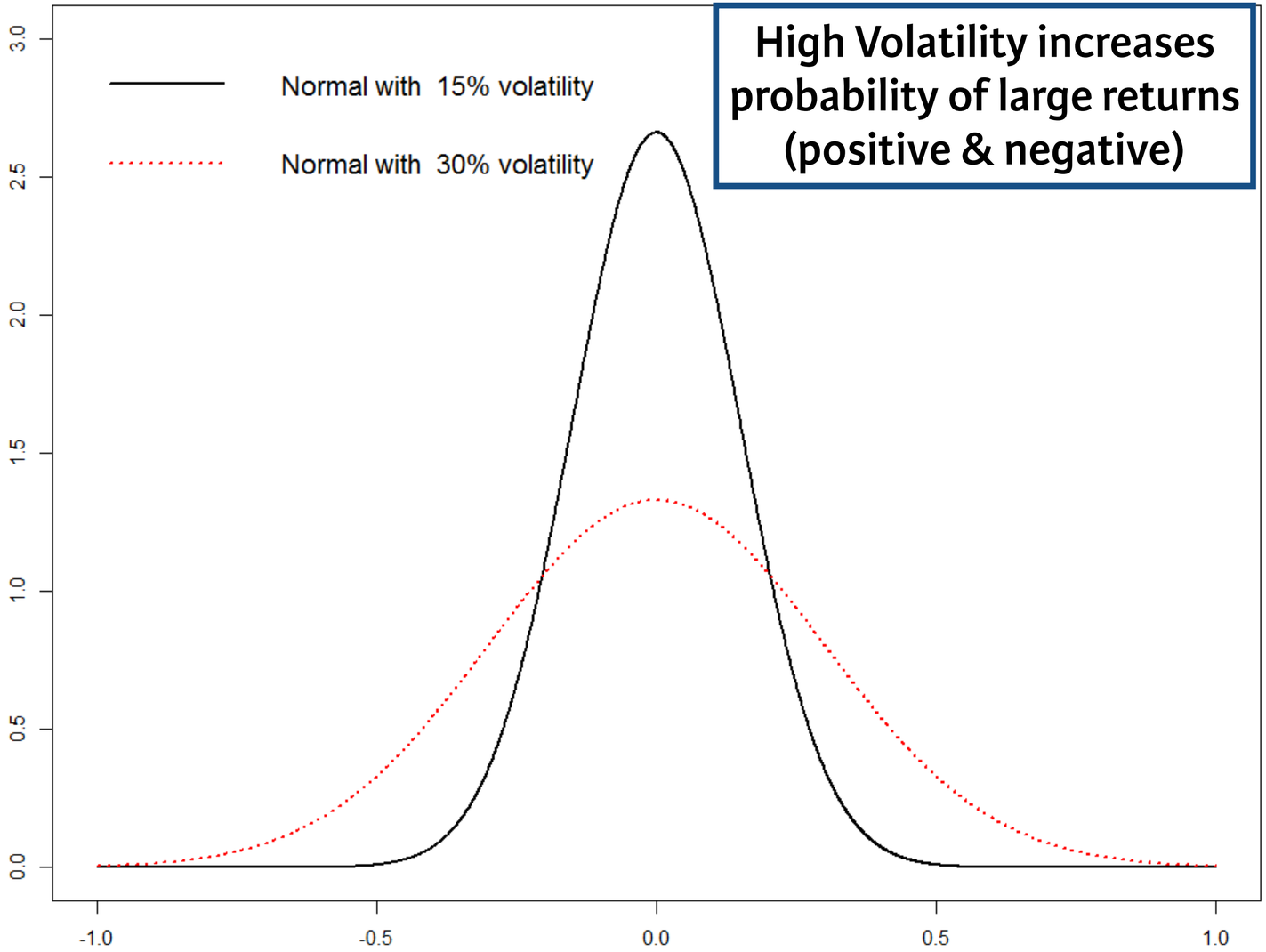
INTRODUCTION TO PORTFOLIO ANALYSIS

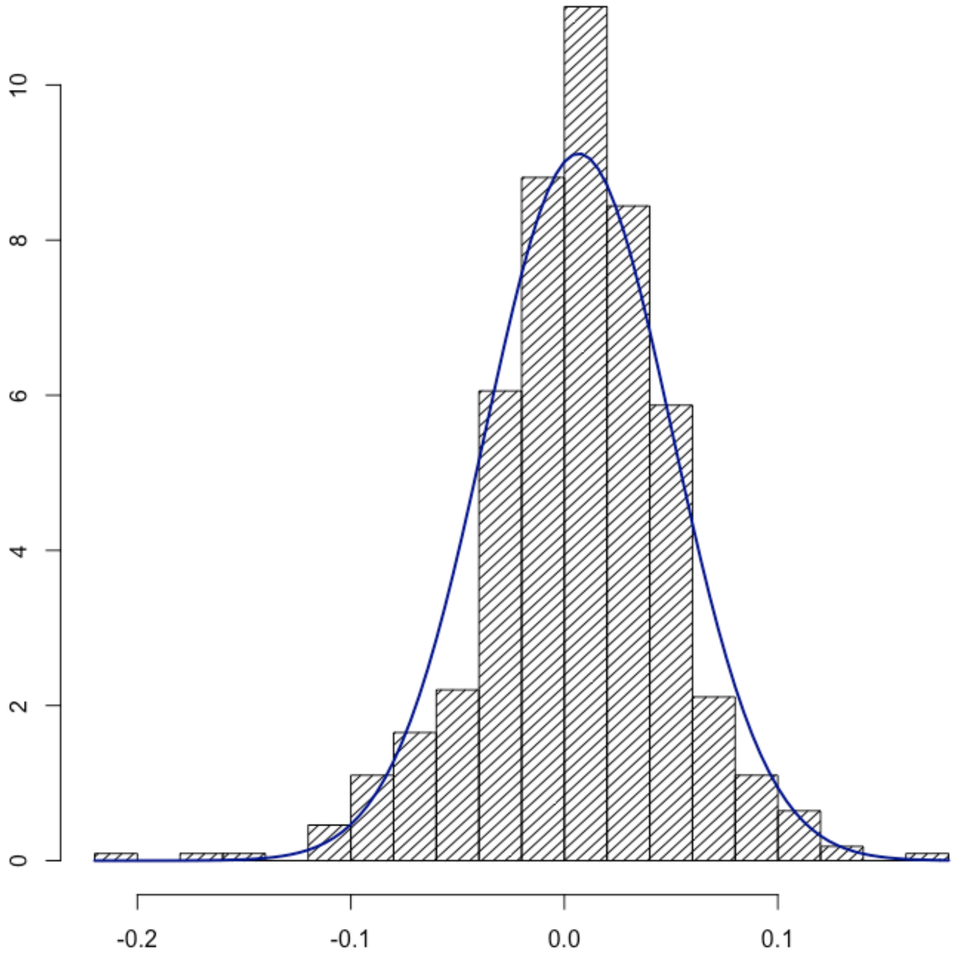
Non-Normality of the Return Distribution

Volatility Describes “normal” Risk



High Volatility increases probability of large returns (positive & negative)

Non-Normality of Return



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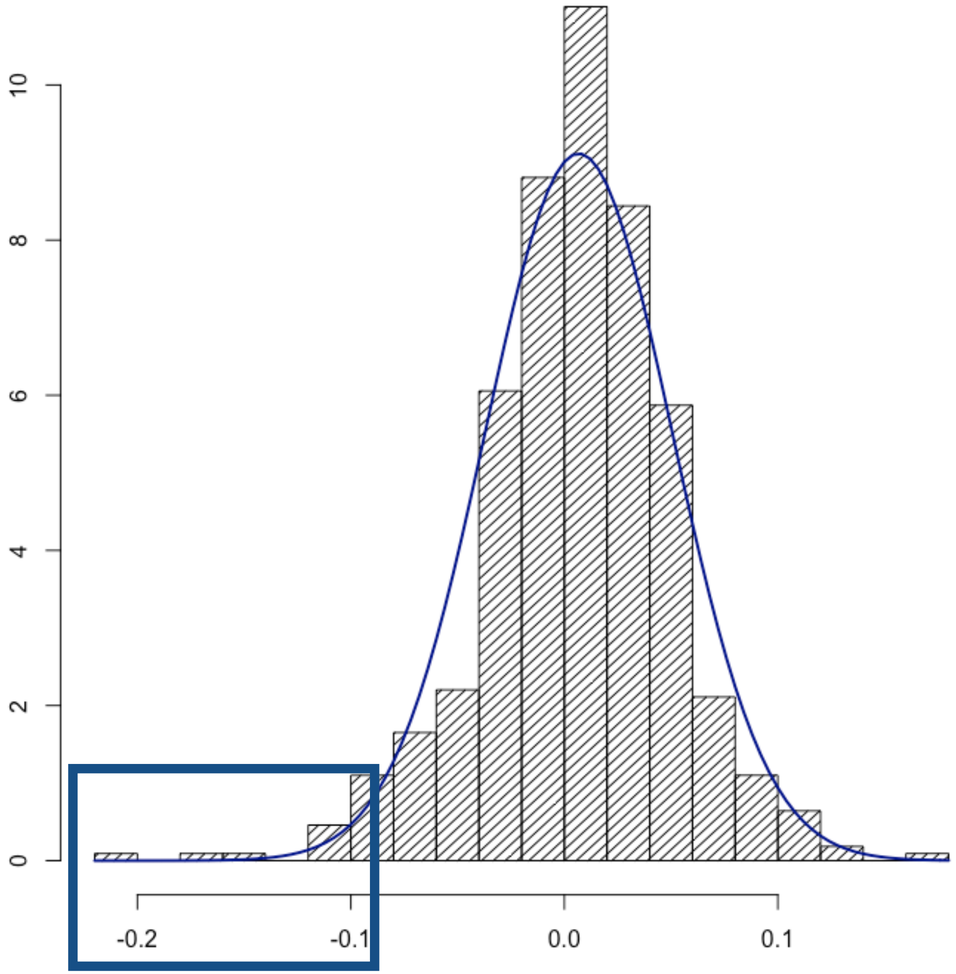

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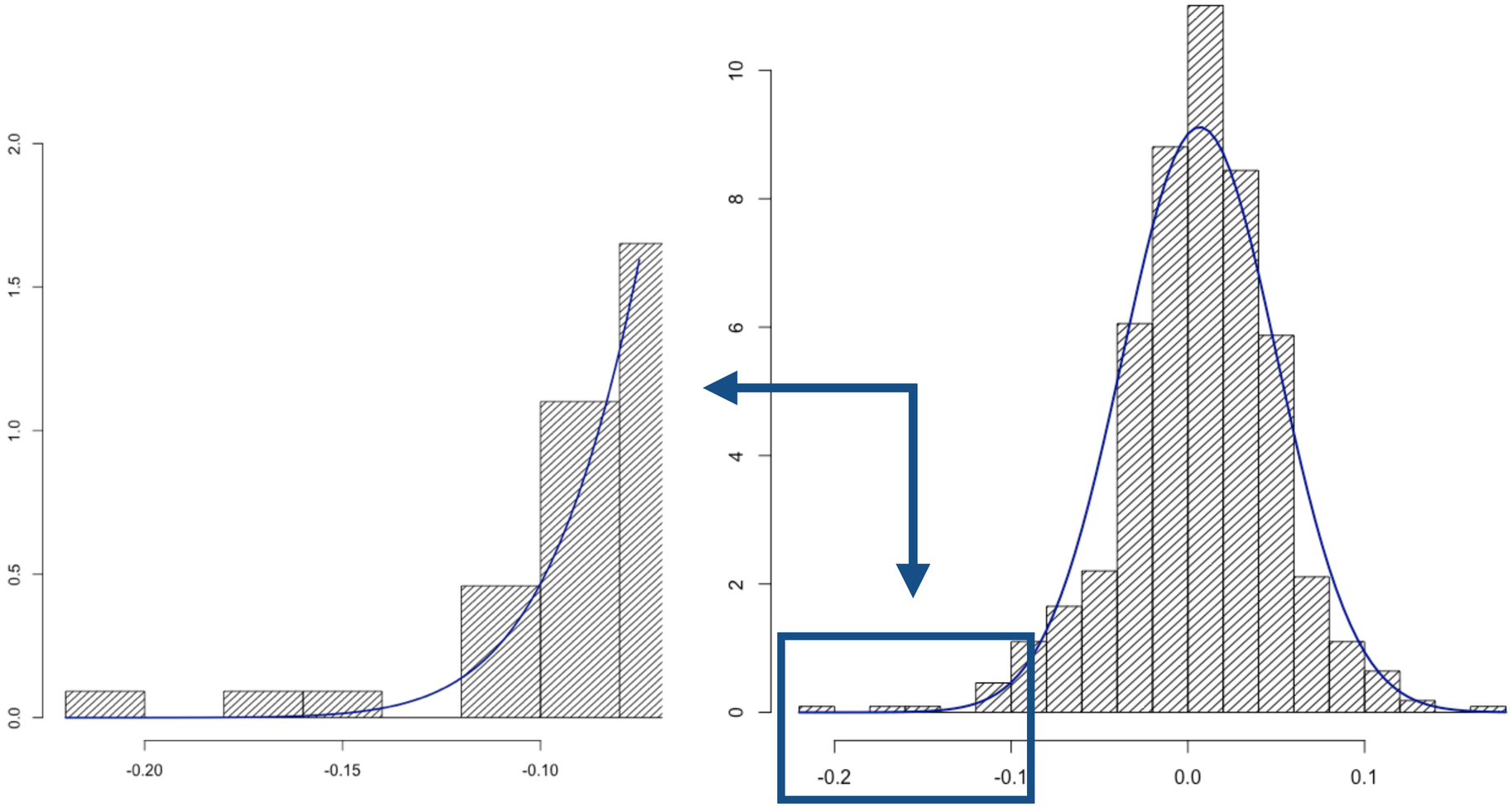

Portfolio Return Semi-Deviation

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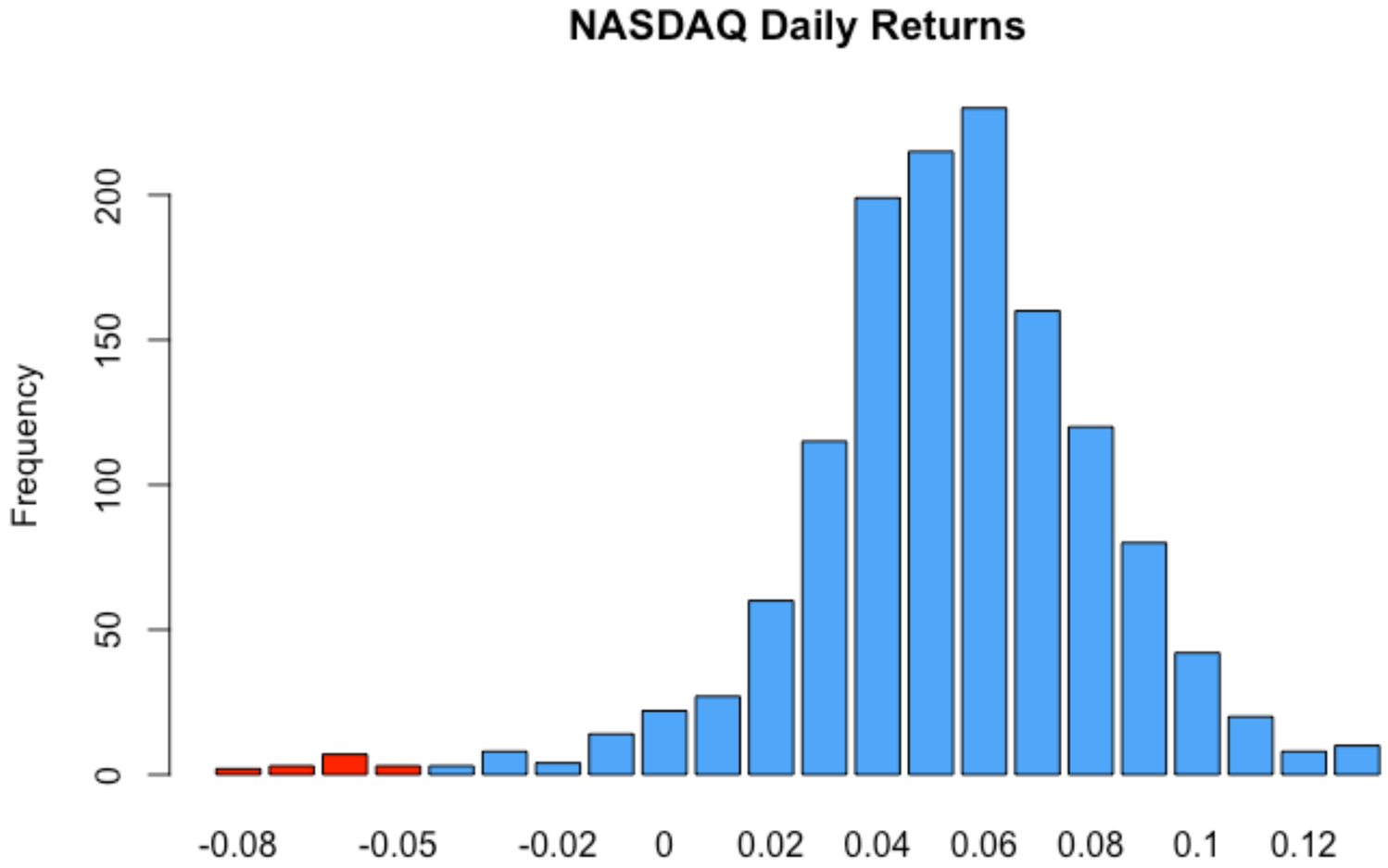
- **Semi-Deviation** of Portfolio Returns:
  - Take the *subset* of returns below the mean

$$SemiDev = \sqrt{\frac{(Z_1 - \mu)^2 + (Z_2 - \mu)^2 + ... + (Z_n - \mu)^2}{n}}$$

Value-at-Risk & Expected Shortfall



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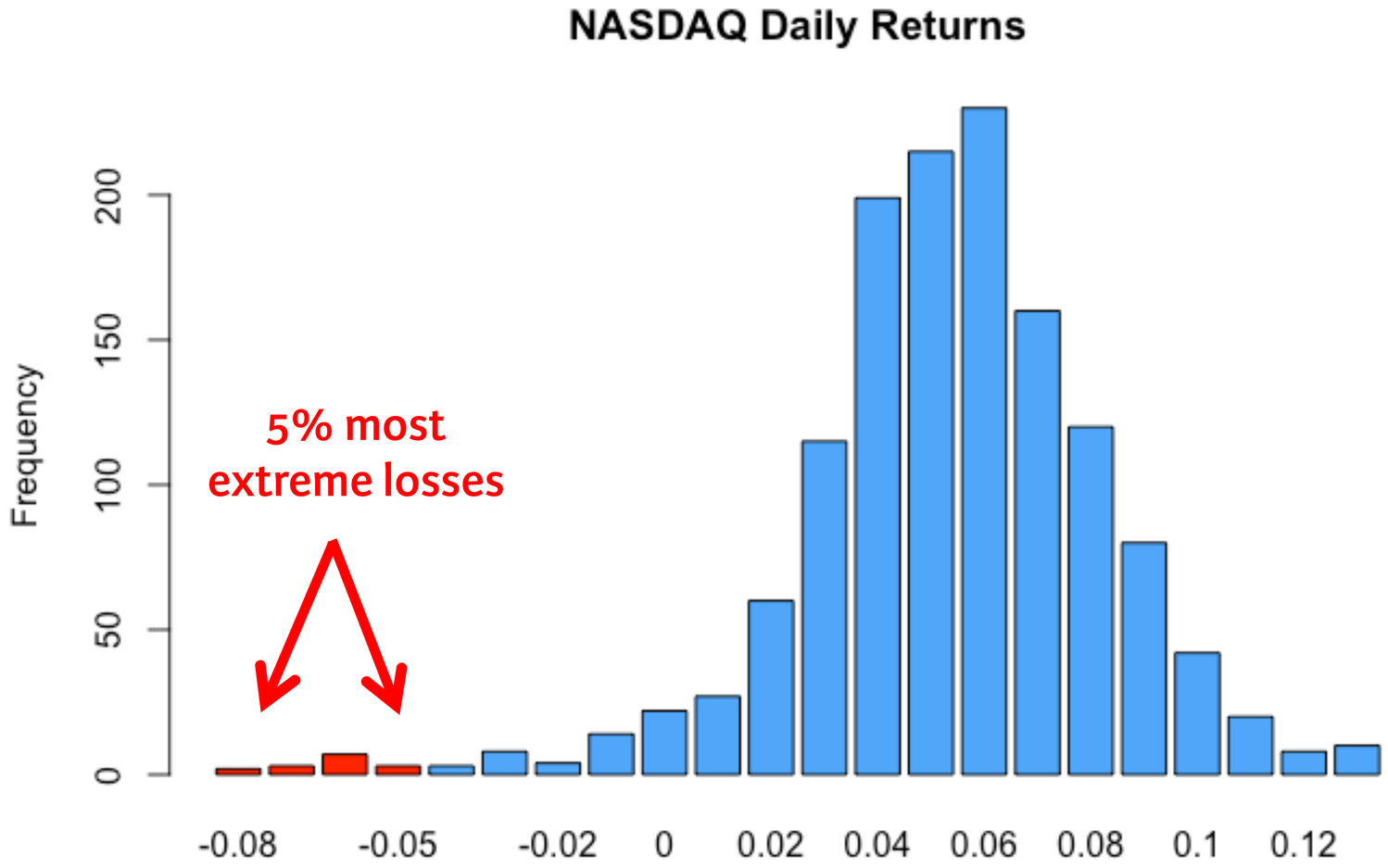

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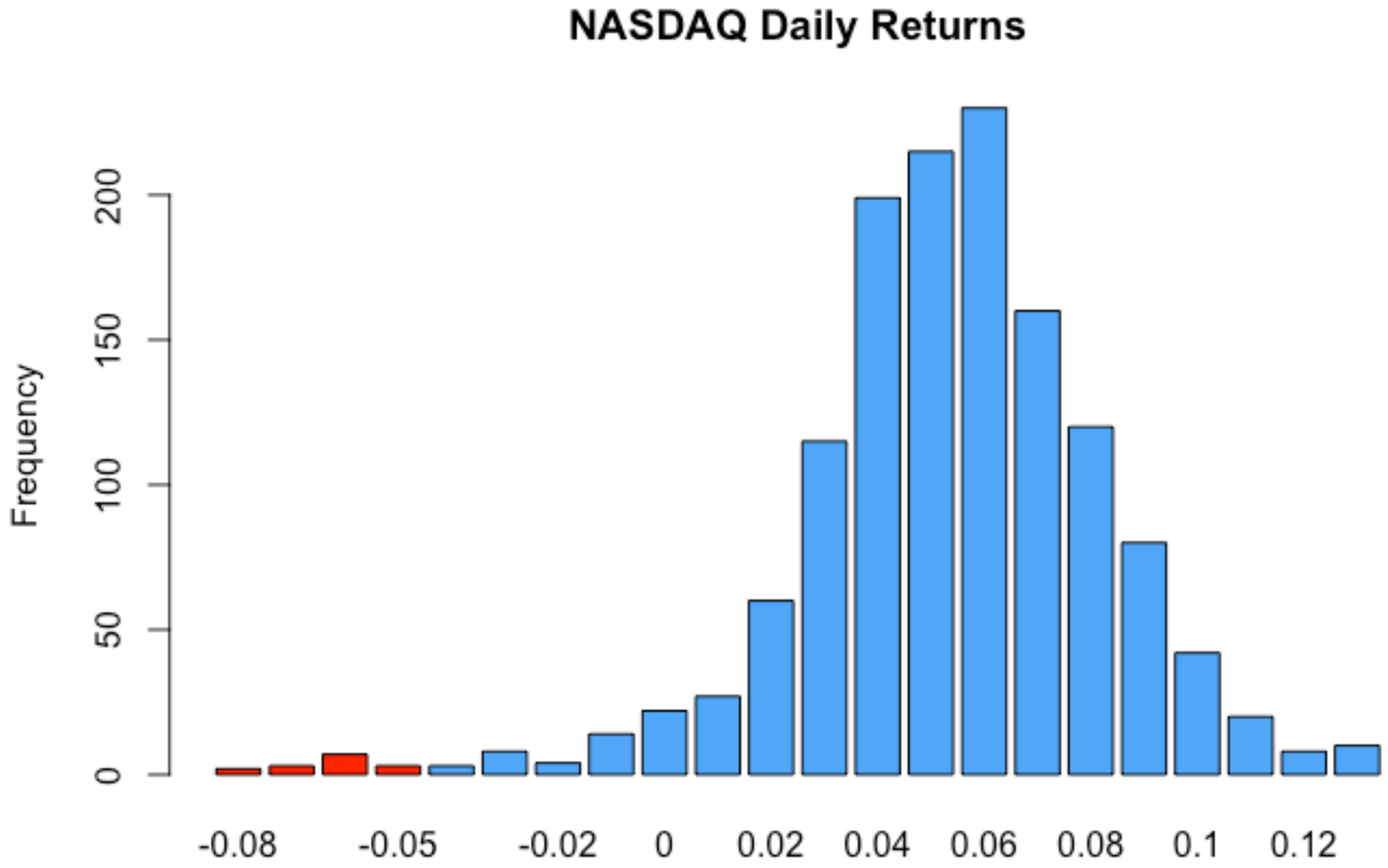

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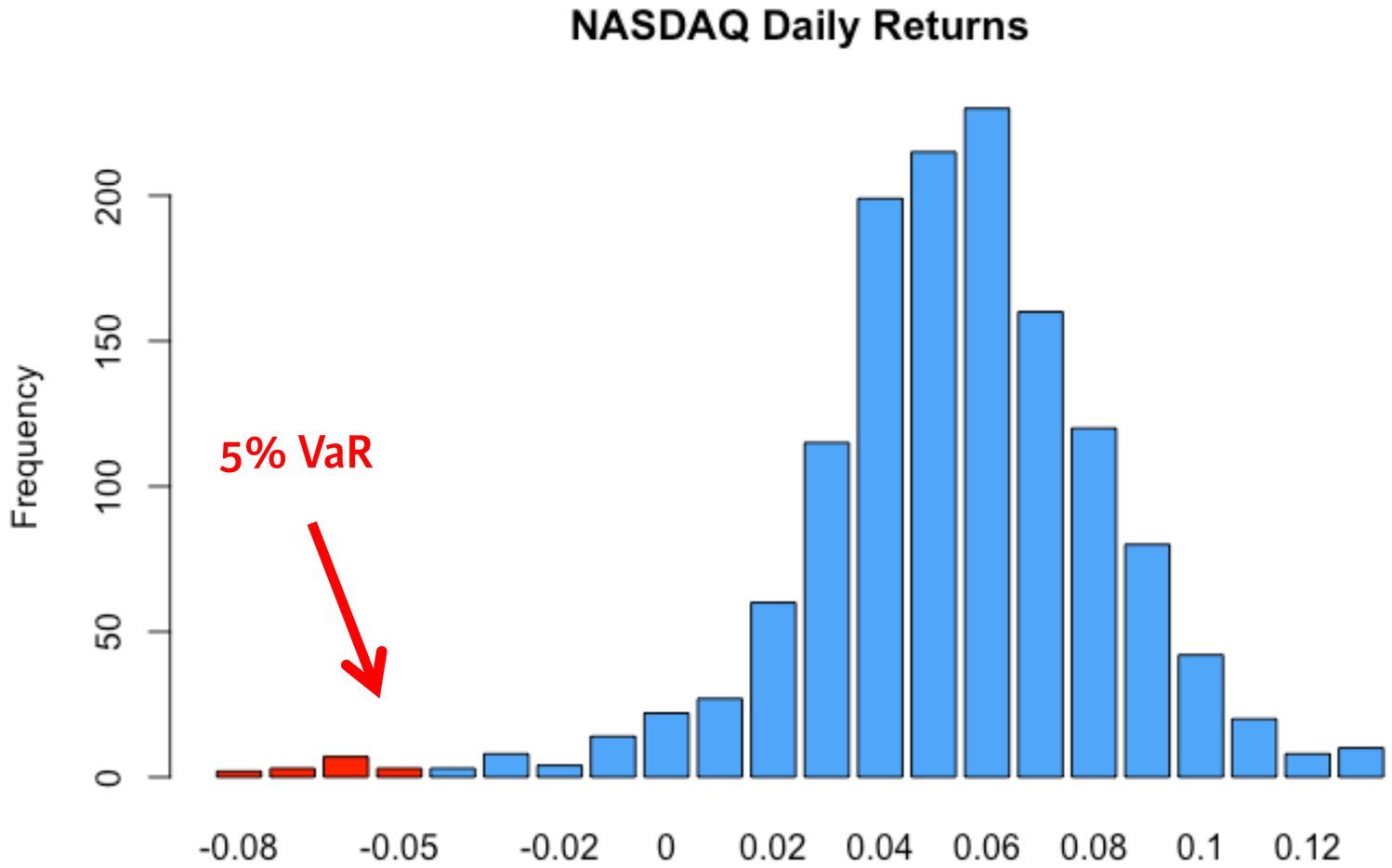

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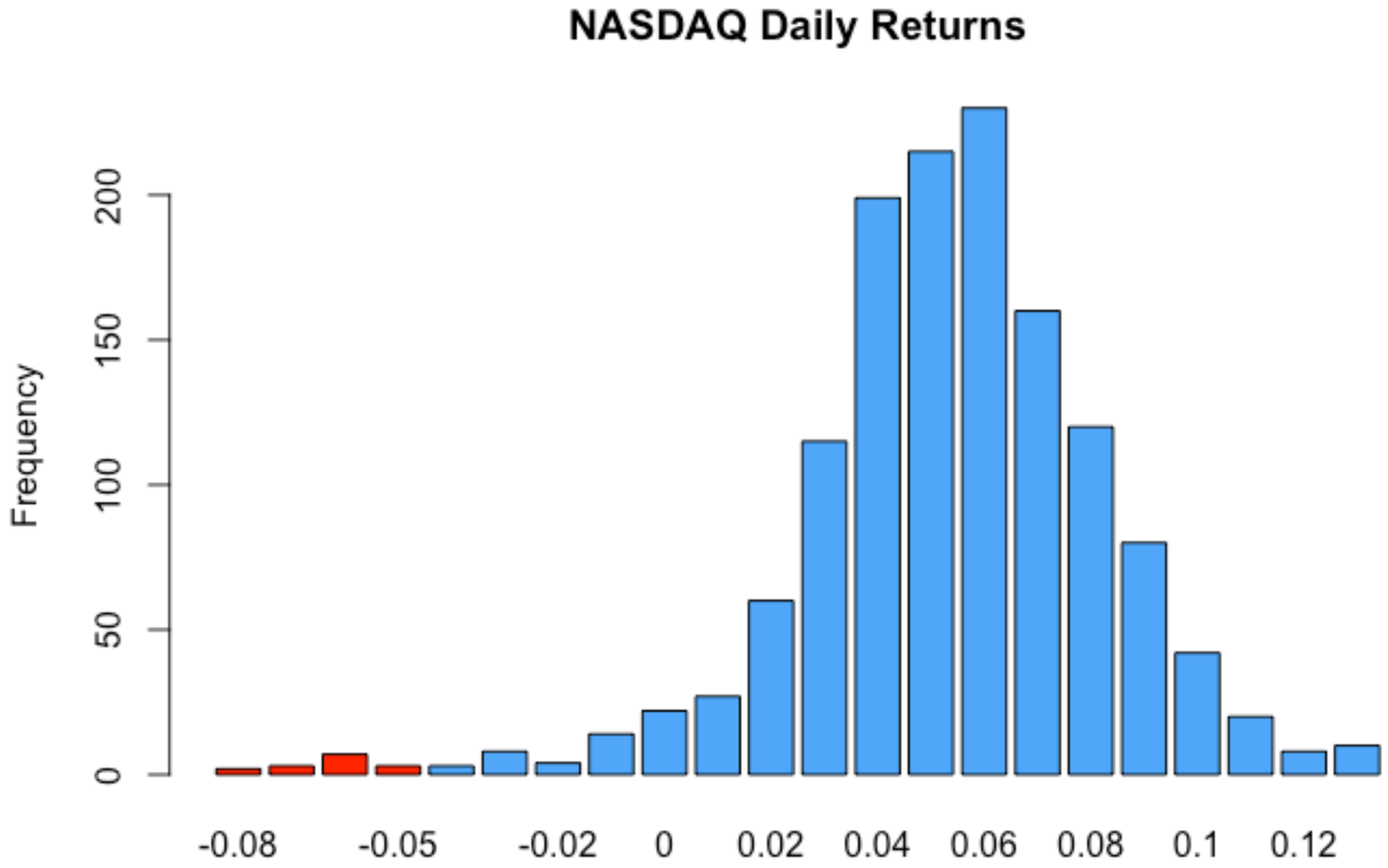

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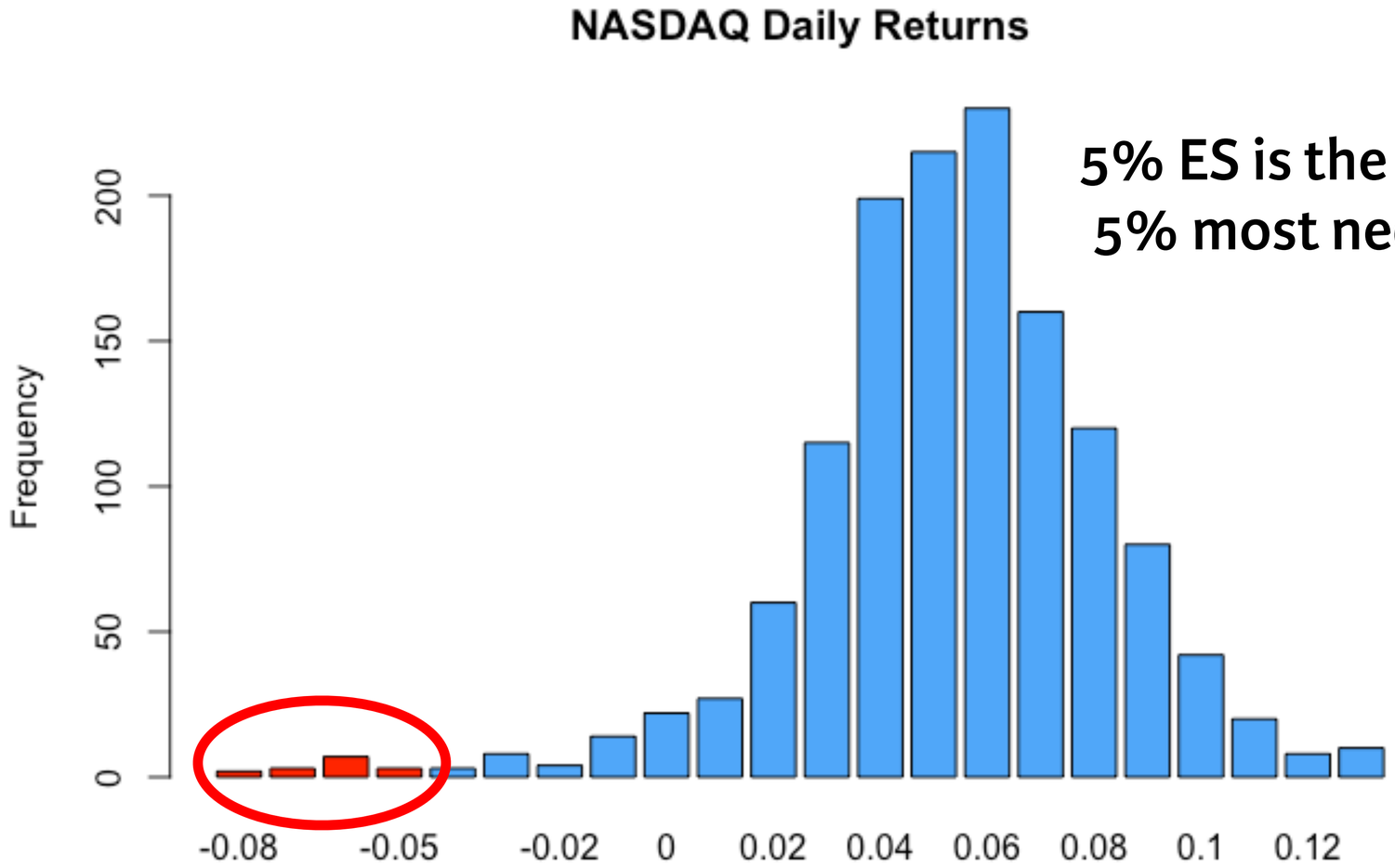

5% ES is the average of the 5% most negative returns

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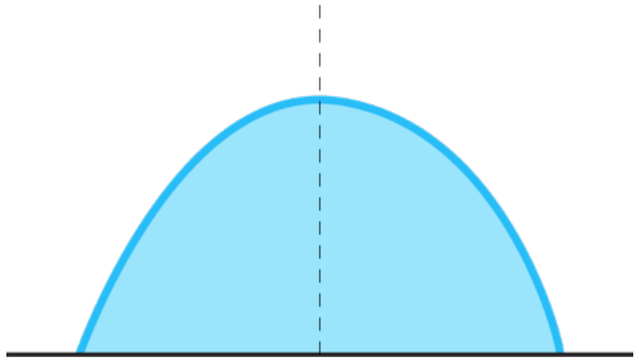

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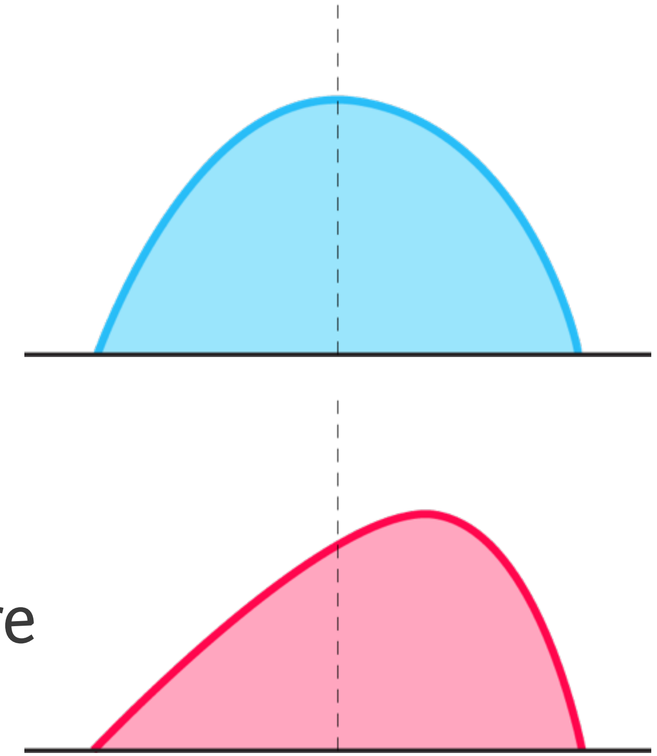

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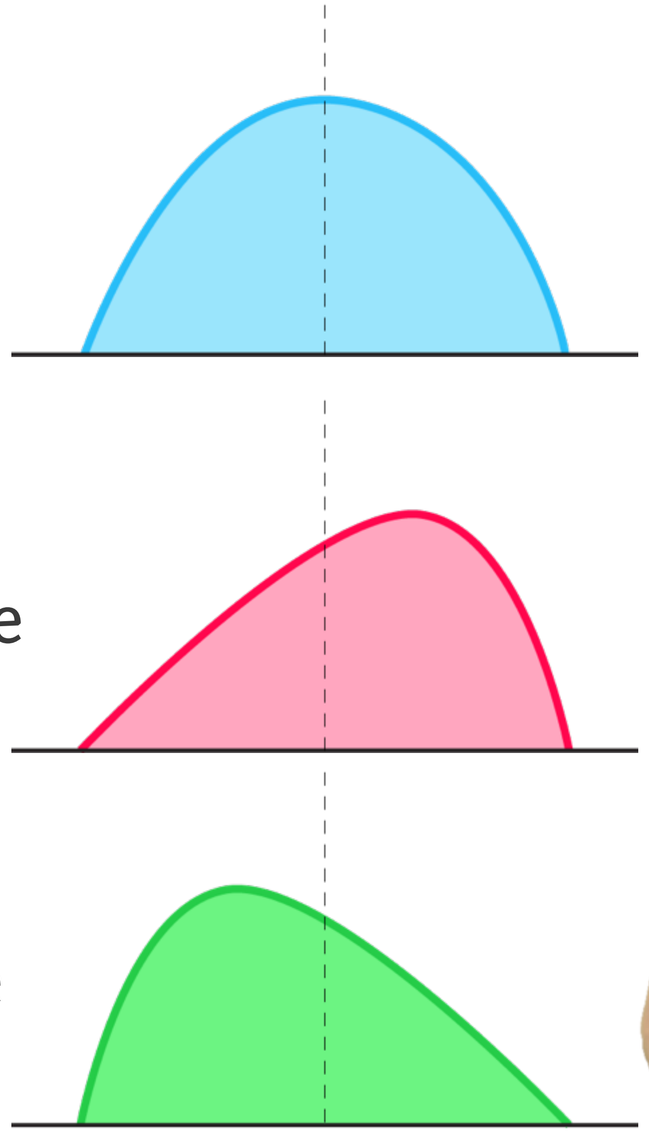
  - Large positive returns occur more often than large negative returns



Kurtosis

- The distribution is fat-tailed when the excess kurtosis > 0