**Z-Score Analysis**

**Z-Score Analysis I**

- Excess return was adjusted for market of holdings til and cross-sectional dispersion by calculating Z-scores using the following formula:
  
  \[
  Z-score = \frac{\text{Excess Return}_{in} - \text{E} \times \text{(Beta)}_{in}}{\text{Standard Deviation} \times \text{Beta}}
  \]

  - **Til:** Then we made new correlations using different managers per group.
  - **Manager-Specific Histogram:** For each individual manager a z-score was grouped into bins and plotted with the bell-shaped curve with mean and standard deviation.
  - **Manager Data:** Discretion returns for each individual manager and the number of stocks that particular manager was handling. We used data for 40 managers in our analysis.

**Z-Score Analysis II**

- Based on the histograms of total observation for different benchmarks (not normalized), we used a Gaussian histogram to determine the significance of the random pattern over time extended period of time.

- The fitting result tells us that the manager performance distribution is not deviating from normal distribution. However, the high chi-square and adjusted R2 values of the fitting (R2) is strong indication that the distribution of manager performance is close to normal distribution.

**Conclusion**

- The key finding is that when discrete excess returns are adjusted for number of holdings in portfolio and cross-sectional dispersion of returns we can model the return pattern of all the managers over a long period of time using a normal distribution.
- **Manager-specific:** The manager-specific histograms were grouped into bins and plotted with the bell-shaped curve with mean and standard deviation.
- **Manager data:** Discretion returns for each individual manager and the number of stocks that particular manager was handling.
- **Manager specific:** The analysis was focused on how the managers were handling different assets.

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