Value at Risk (VAR)

- **VAR is the maximum loss over a target horizon within a confidence interval (or, under normal market conditions)**

- In other words, if none of the “extreme events” (i.e., low-probability events) occurs, what is my maximum loss over a given time period?
Consider a $100 million portfolio of medium-term bonds. Suppose my confidence interval is 95% (i.e., 95% of possible market events is defined as “normal”). Then, what is the maximum monthly loss under normal markets over any month?

To answer this question, let’s look at the monthly medium-term bond returns from 1953 to 1995:

- Lowest: -6.5% vs. Highest: 12%
History of Medium Bond Returns
Distribution of Medium Bond Returns

**Occurrences out of 516**

**5% Loss Probability**

**Monthly Returns**
Calculating VAR at 95% Confidence

- At the 95% confidence interval, the lowest monthly return is -1.7%. (I.e., there is a 5% chance that the monthly medium bond return is lower than -1.7%)

- That is, there are 26 months out of the 516 for which the monthly returns were lower than -1.7%.

- \( \text{VAR} = 100 \text{ million } \times 1.7\% = $1.7 \text{ million} \)
  (95% of the time, the portfolio’s loss will be no more than $1.7 million!)
Issues to Ponder

■ What horizon is appropriate?
   A day, a month, or a year?

■ What confidence level to consider?
   * Are you risk averse?

   The more risk averse => (1) the higher confidence level necessary & (2) the lower VAR desired.