Capital Market Theory

Return & Risk Calculations, Risk Premiums, and Historical Averages

Returns

- **Dollar Returns** have 2 components:
  - *Income Component:* Direct cash payments (e.g., dividends or interest)
  - *Price Change*: Capital gain or loss
    - Whether realized or unrealized, capital gain/loss is always part of the total return
- **Percentage Return**:

Dividend yield % + Capital gains yield %

$$R_t = D_{t+1}/P_t + (P_{t+1} - P_t)/P_t$$

Average and Holding Period Returns

- Average or Mean returns: $\sum R_t / T$
  - Arithmetic mean; Intuitive
- Average annual return for 1991 - 2003:13.53%
- Holding period returns:

$[(1+R_1) * (1+R_2) * (1+R_3) * \ldots * (1+R_T)] - 1$

- $HPR_{1991 - 2003} = 4.32175 - 1 = 332.175\%$
- $100,000 invested on 1/1/91 would have grown to $432,175 on 12/31/03

Geometric Mean Returns

- Geometric Mean returns (superior):

$[(1+R_1) *(1+R_2) *(1+R_3) *\ldots * (1+R_T)]^{(1/T)} - 1$

- $G.M._{1991 - 2003} = (4.32175)^{1/13} -1=11.92\%$
- $HPR_{1991 - 1999} = 5.48006 -1 = 448.01\%$
- $100,000 invested on 1/1/91 would have grown to $548,006 on 12/31/99
- $G.M._{1991 - 1999} = (5.48006)^{1/9} -1=20.81\%$

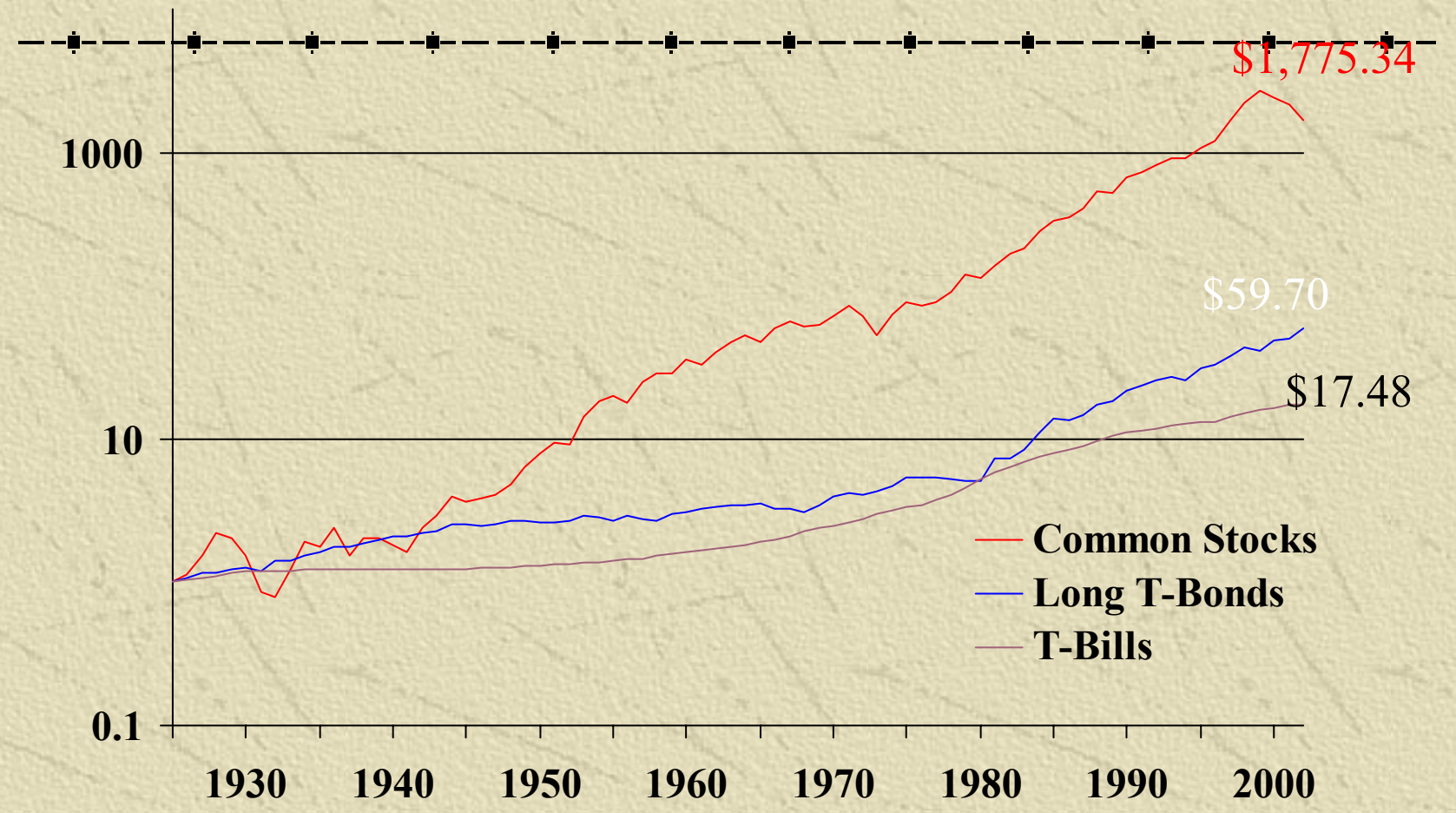
Risk

- Variance = $\sigma^2 = \sum (R_t - R)^2/(T-1)$
- $\text{Variance}_{1991\text{-}2003} = 0.0475$
- $\text{S.D.}_{1991\text{-}2003} = 0.2179$
- Normal distribution

Average Returns and Risk Premiums (Historical)

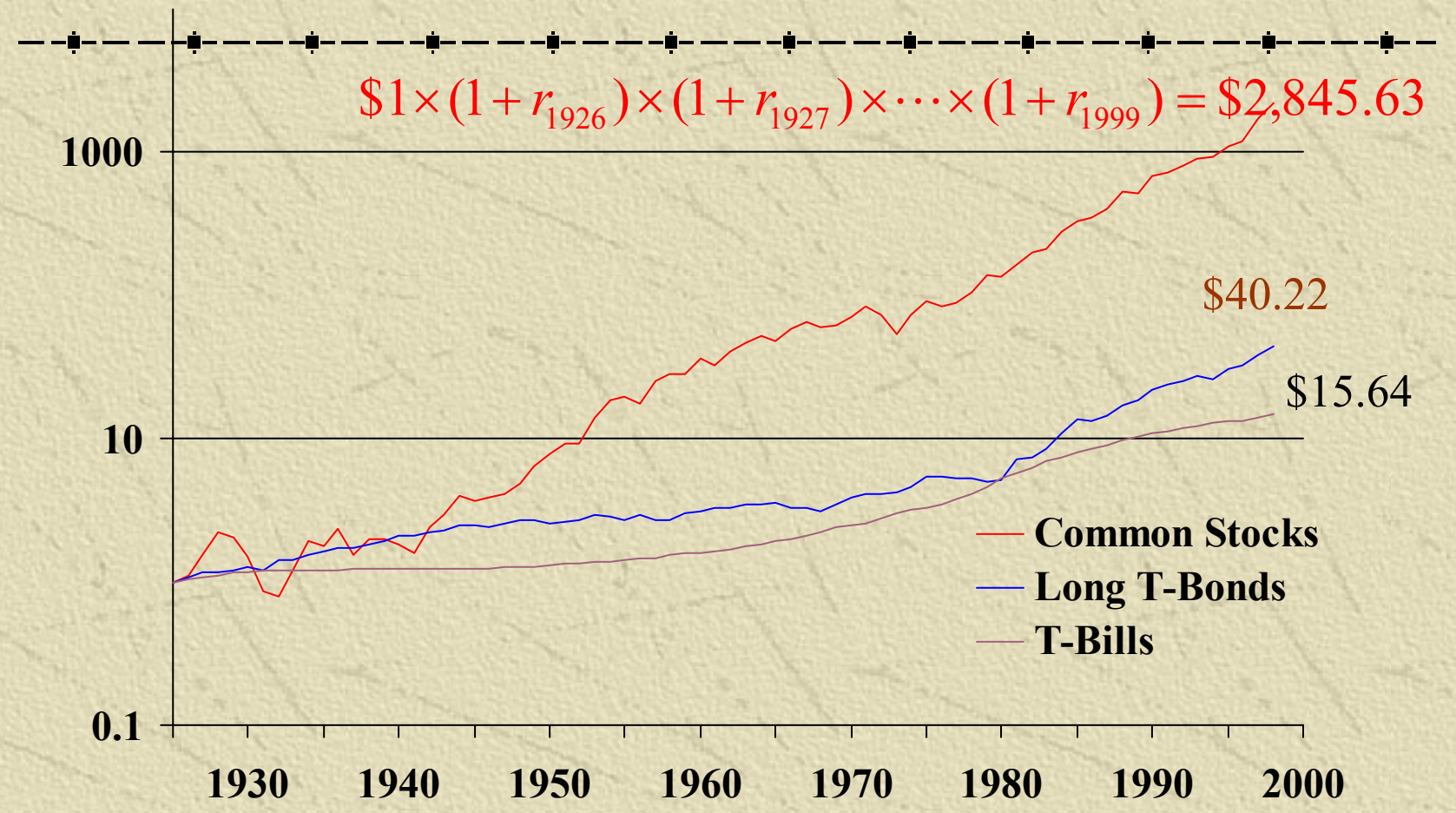
- **Risk Premium** = *excess return* = return on an asset - risk-free return
- Real Return = Nominal Return (GM) - Inflation
- *99 years* of investing in T-Bills (@0.7%) to double one's REAL wealth
  - *Only 9.6 years* (@7.5%)of stock investment

The Future Value of an Investment of $1 in 1925



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The Future Value of an Investment of $1 in 1926

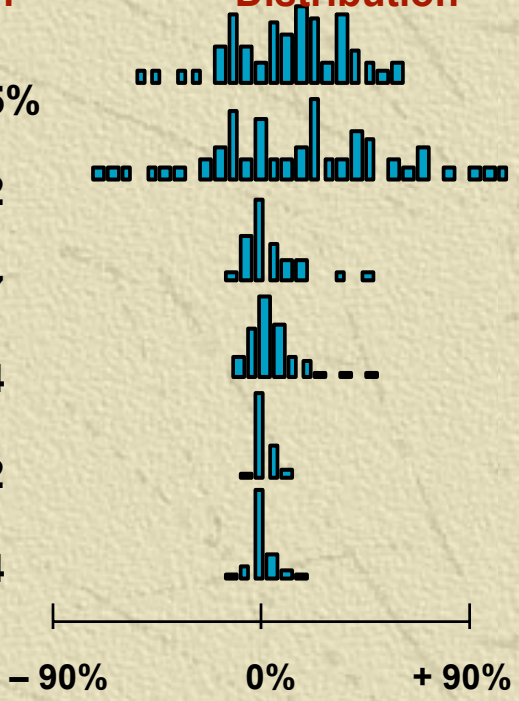


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Historical Returns, 1926-2002

Series	Average Annual Return	Standard Deviation
Large Company Stocks	12.2%	20.5%
Small Company Stocks	16.9	33.2
Long-Term Corporate Bonds	6.2	8.7
Long-Term Government Bonds	5.8	9.4
U.S. Treasury Bills	3.8	3.2
Inflation	3.1	4.4

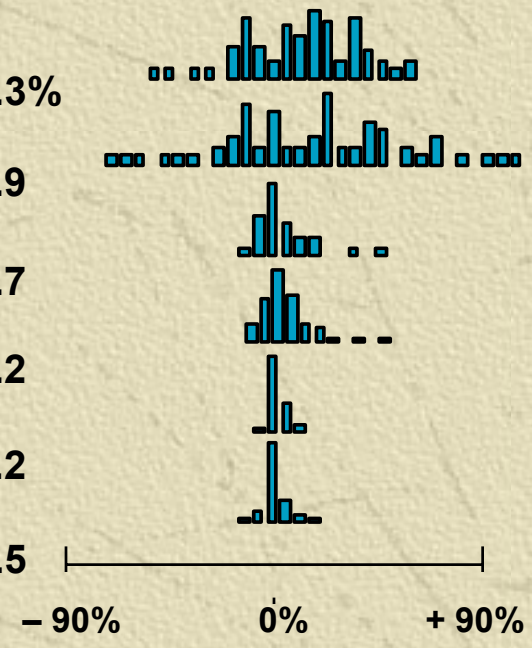
Distribution



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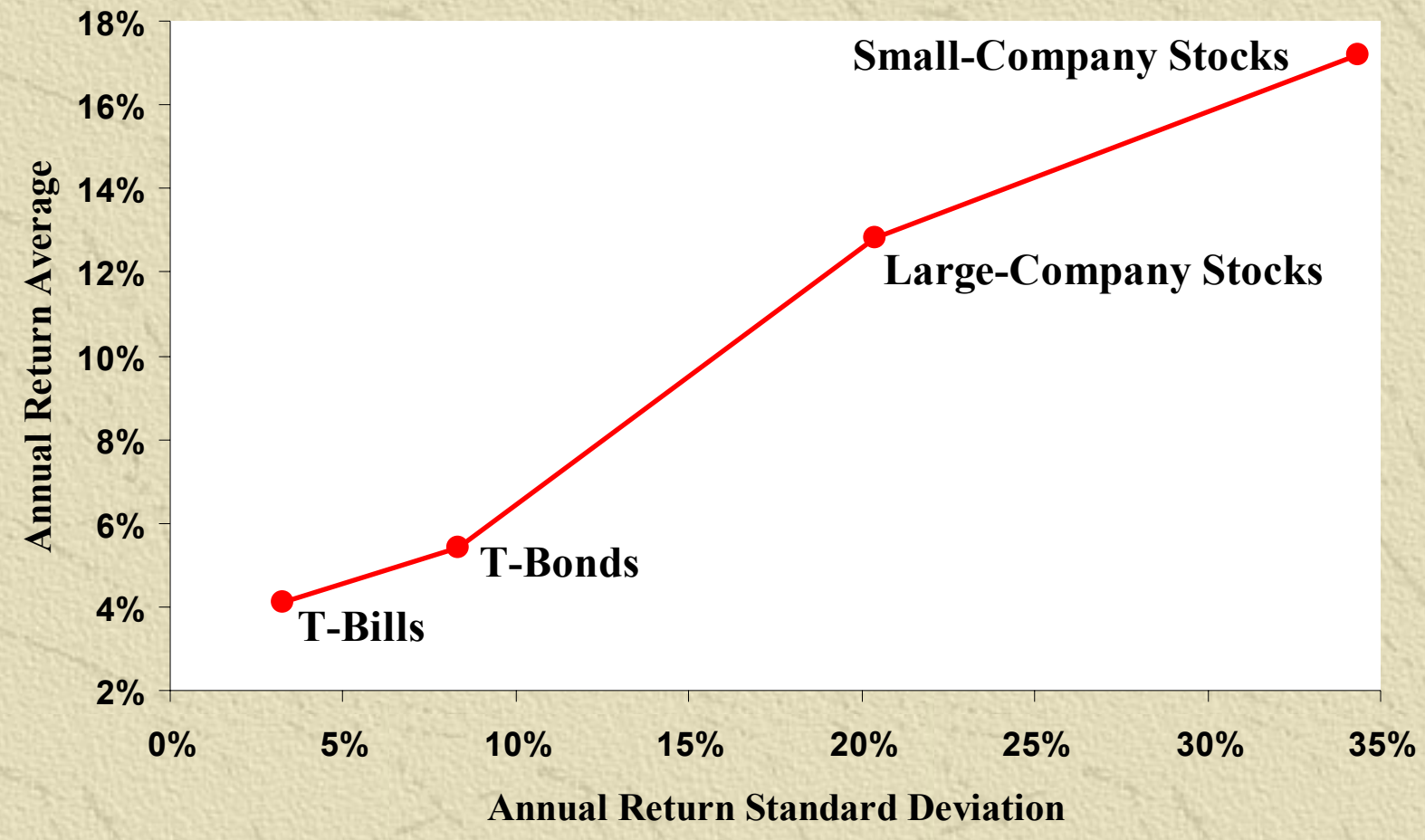
Historical Returns, 1926-1999

Series	Average Annual Return	Standard Deviation	Distribution
Large Company Stocks	13.0%	20.3%	
Small Company Stocks	17.7	33.9	
Long-Term Corporate Bonds	6.1	8.7	
Long-Term Government Bonds	5.6	9.2	
U.S. Treasury Bills	3.8	3.2	
Inflation	3.2	4.5	

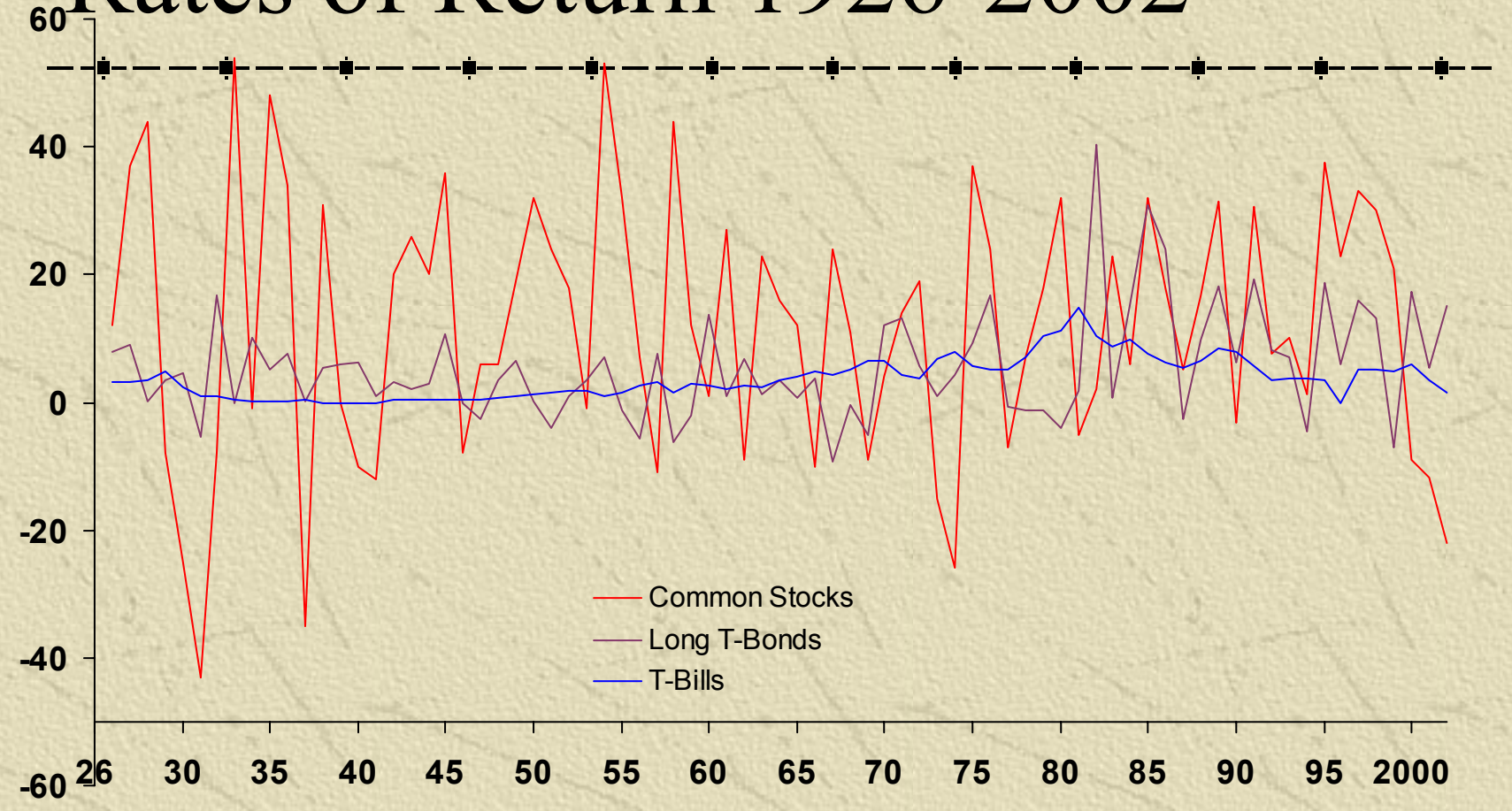


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The Risk-Return Tradeoff

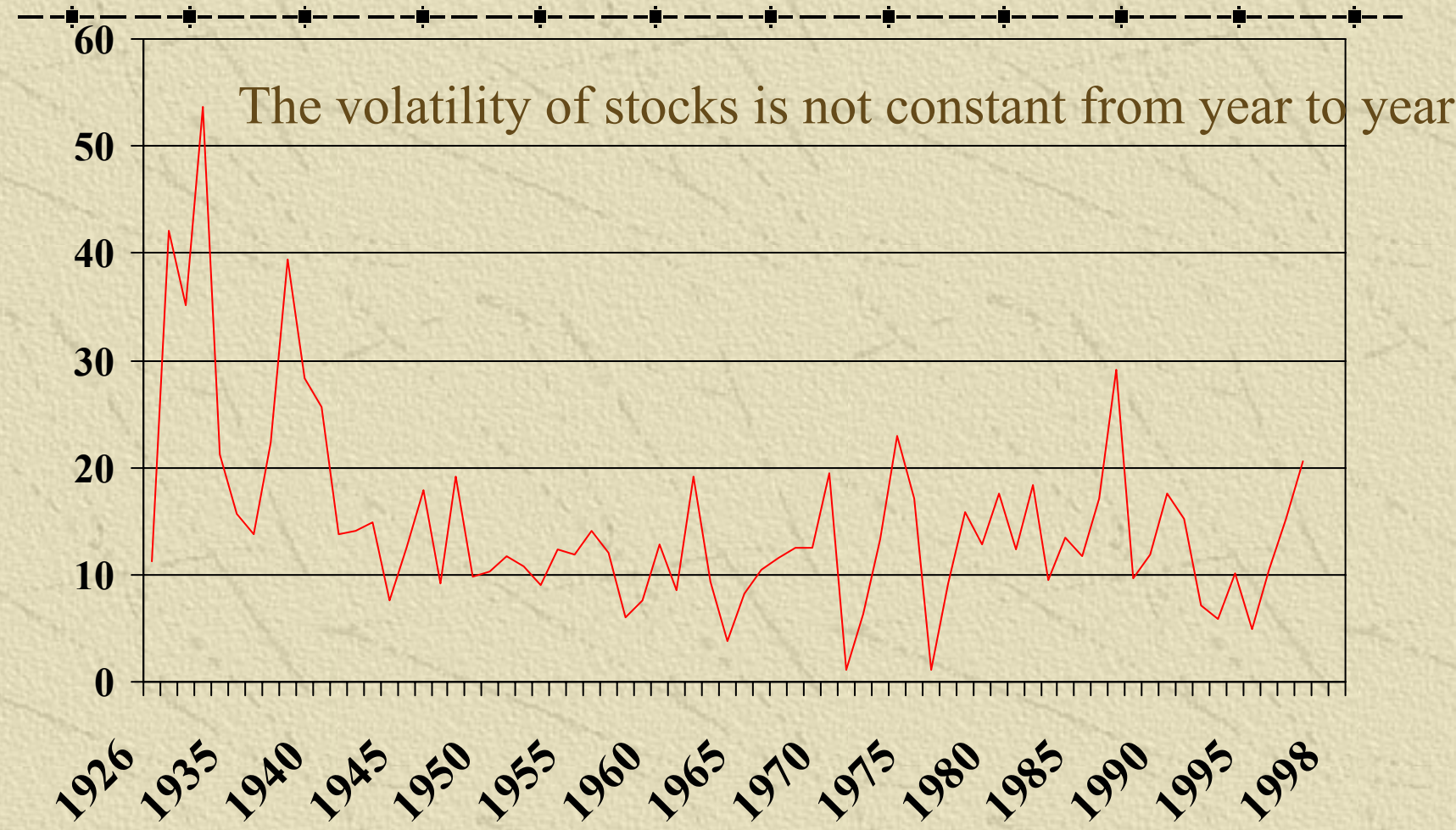


Rates of Return 1926-2002



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Stock Market Volatility



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Small-Cap Effect?

$1	1926-1996	excluding 1974-1983
Large	$1,370	$368
Small	$3,990	$263

- Is the whole "small-cap" effect a result of a "freakish" 9-year period?
- What about risk of small-caps??
- Can you eliminate that by diversification?
- H.W. 2, 4, 6-9, 12, 14, 16, 19