Principles of Corporate Finance

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CHAPTER 11

Introduction to Risk, Return and the Cost of Capital

"In the business world, the rearview mirror is always clearer than the windshield"

Warren Buffet

Risk

Risk presents both danger and opportunity

Rates of Return

$$\text{Percentage Return} = \frac{\text{Dividend} + \text{Capital Gain}}{\text{Initial Share Price}}$$

$$\text{Percentage Return} = \frac{.40 + 2.82}{12.61}$$

$$= .255 \text{ or } 25.5\%$$

Rates of Return

$$\text{Percentage Return} = \text{Div. Yield} + \text{Cap. Gain Yield}$$

$$\text{Dividend Yield} = \frac{\text{Dividend}}{\text{Initial Share Price}}$$

$$\text{Capital Gain Yield} = \frac{\text{Capital Gain}}{\text{Initial Share Price}}$$

Rates of Return

$$\text{Dividend Yield} = \frac{.40}{12.61}$$

$$= .032 \text{ or } 3.2\%$$

$$\text{Capital Gain Yield} = \frac{2.82}{12.61}$$

$$= .224 \text{ or } 22.4\%$$

Market Indexes

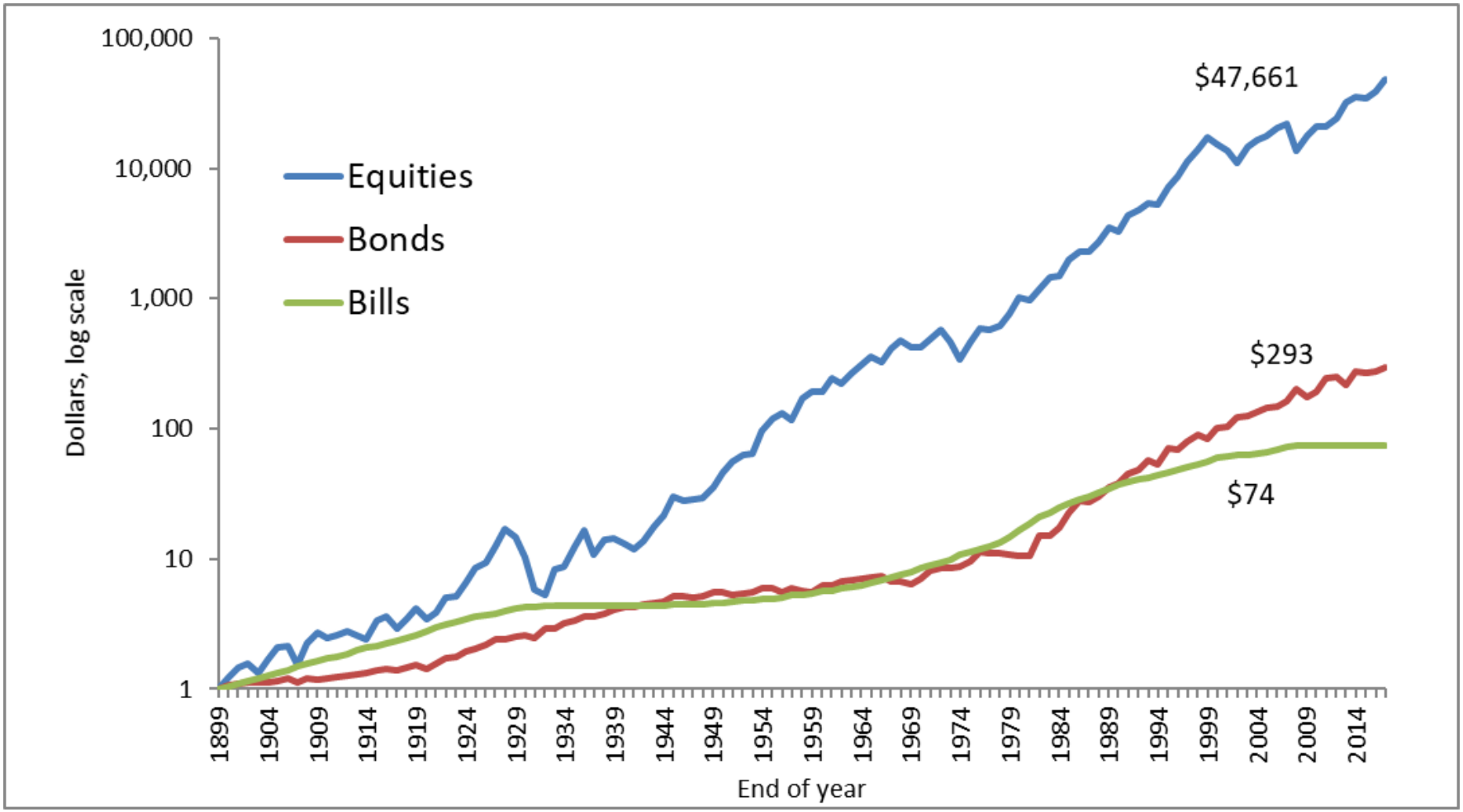
Dow Jones Industrial Average (The Dow)

Value of a portfolio holding one share in each of 30 large industrial firms.

Standard & Poor's Composite Index (The S&P 500)

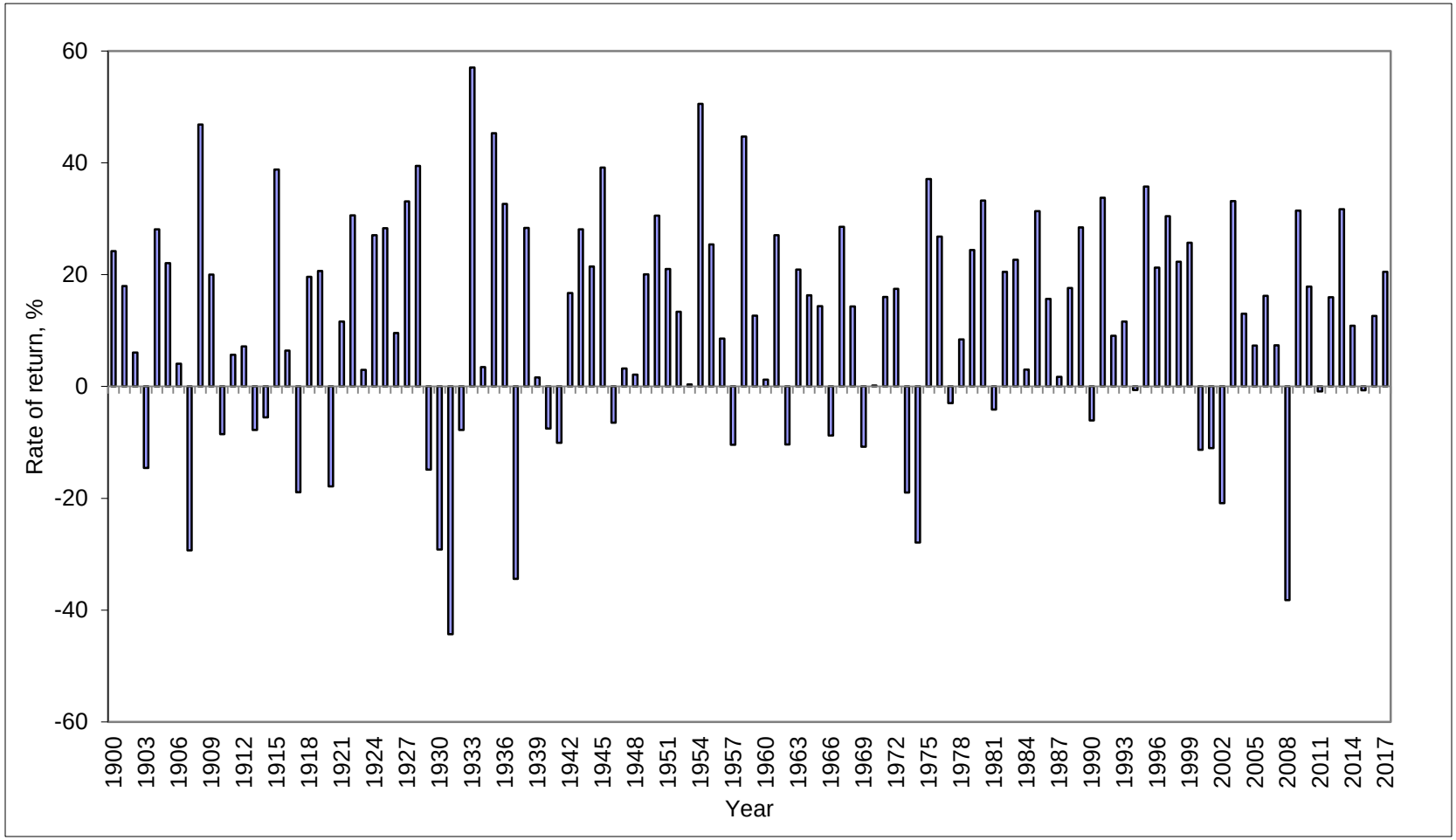
Value of a portfolio holding shares in 500 firms. Holdings are proportional to the number of shares in the issues.

The Value of a $1 Investment in 1900

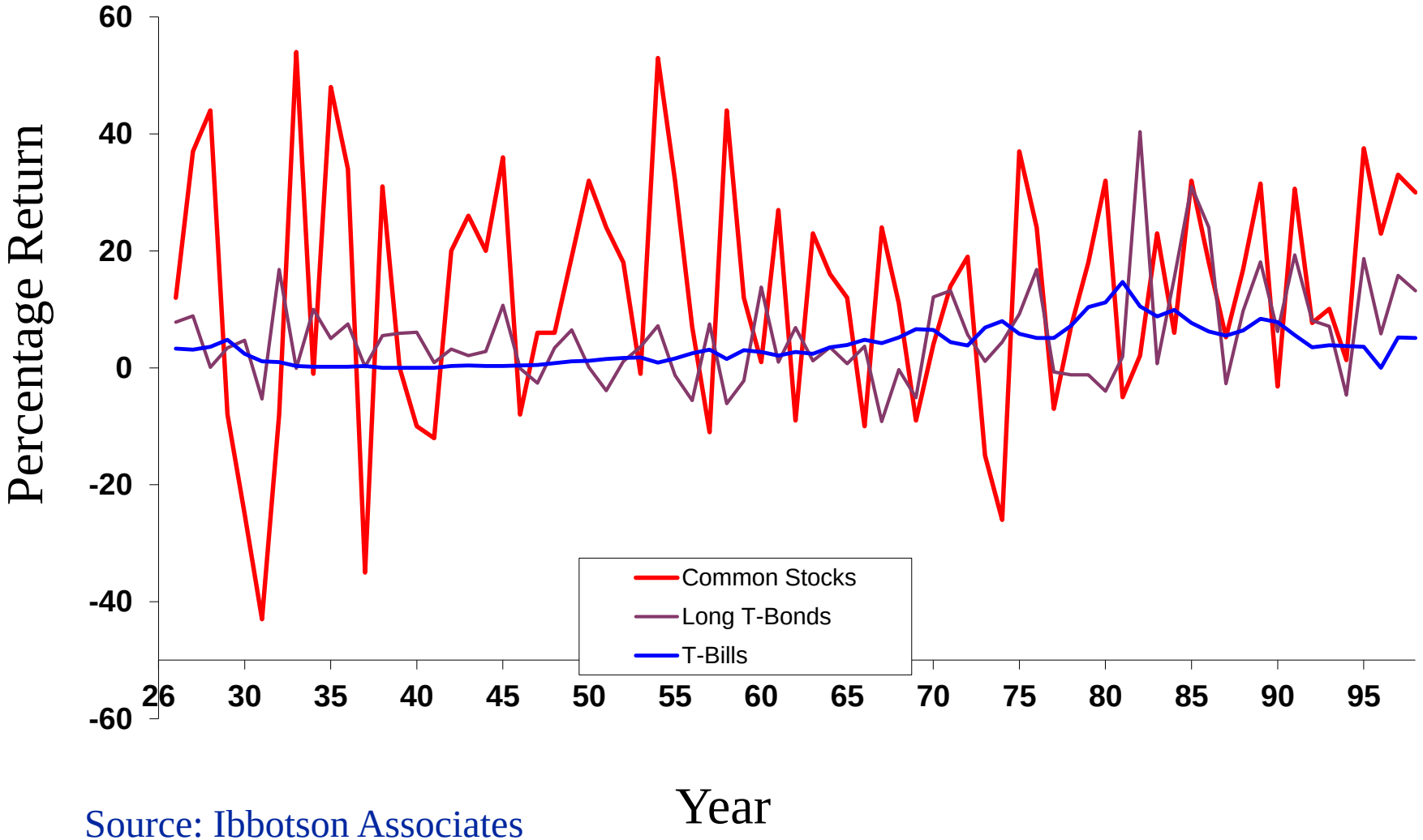


Rates of Return

Common Stocks (1900-2017)



Rates of Return 1926-1998



Source: Ibbotson Associates

Expected Return

Instrument	Avg ROR	Avg Risk Prem.
T.Bill (r_f)	3.8	---
T. Bond	5.3	1.5
Common Stock (r_m)	11.5	7.7 (r_m-r_f)

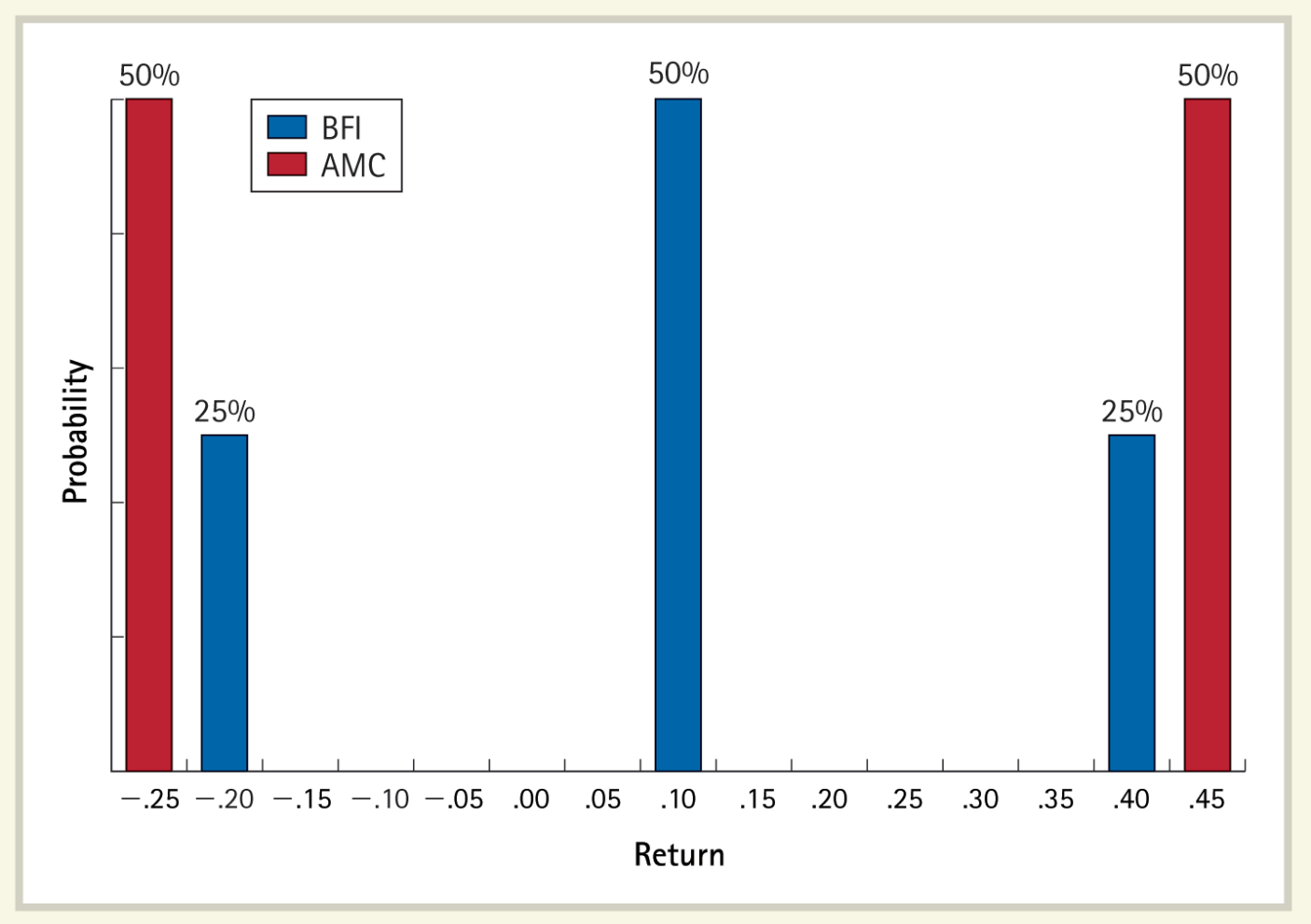
Expected market return	=	interest rate on Treasury bills	+	normal risk premium
(1981) 21.7%	=	14	+	7.7
(2018) 9.4%	=	1.7	+	7.7

Measuring Risk

Variance - Average value of squared deviations from mean. A measure of volatility.

Standard Deviation – Square root of the average value of squared deviations from mean. A measure of volatility.

Distribution for BFI and AMC Returns



While both stocks have the same expected return, AMC's return has a higher variance and standard deviation.

Risk and Diversification

Year	Rate of Return, %	Deviation from Average Return, %	Squared Deviation
2008	−37.23	−46.96	2,204.88
2009	28.30	18.58	345.31
2010	17.16	7.44	55.40
2011	0.98	−8.74	76.47
2012	16.06	6.34	40.14
2013	33.06	23.34	544.74
Total	58.33		3,266.95
Average return = 58.33/6 = 9.72%			
Variance = average of squared deviations = 3,266.95/6 = 544.49			
Standard deviation = square root of variance = 23.33%			

Note: Returns shown in the table are rounded to 2 decimal places. The squared deviation in the last column uses the actual returns, without rounding.

Measuring Risk

Percent Rate of Return	Probability of Return	Deviation from Mean	Squared Deviation
+ 40	.25	+ 30	.25 x 900 = 225
+ 10	.50	0	.50 x 0 = 0
- 20	.25	- 30	.25 x 900 = 225

Expected Return = (.25 x 40) + (.50 x 10) + (.25 x -20) = 10

Variance = weighted avg. of squared deviations = 225+0+225 = 450

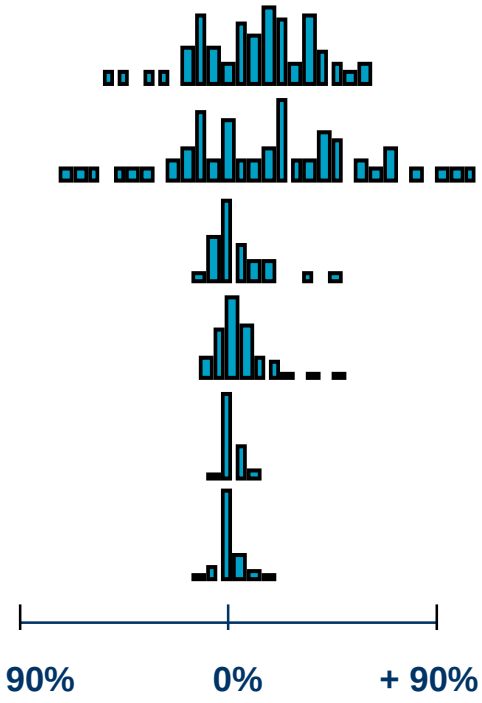
Standard deviation = square of root variance = $\sqrt{450}$ = 21.2%

Expected Return

Instrument	Avg ROR	Risk Prem.	Std. Dev.
T.Bill	3.8	---	2.9
T. Bond	5.3	1.5	9.0
Common Stock	11.5	7.7	19.7

Historical Returns, 1926-2002

Series	Average Annual Return	Standard Deviation	Distribution
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	



Risk and Diversification

Diversification - Strategy designed to reduce risk by spreading the portfolio across many investments.

Unique Risk - Risk factors affecting only that firm. Also called "diversifiable risk."

Market Risk - Economy-wide sources of risk that affect the overall stock market. Also called "systematic risk."

Portfolio Variance

	Auto Stock			Gold Stock		
Scenario	Rate of Return	Deviation from Expected Return	Squared Deviation	Rate of Return	Deviation from Expected Return	Squared Deviation
Recession	-8	-13	169	+20	+19	361
Normal	+5	0	0	+3	+2	4
Boom	+18	13	169	-20	-21	441

Expected Return = (-8 + 5 + 18)/3 = 5% | (+20 + 3 - 20)/3 = 1%

Variance = (169 + 0 + 169)/3 = 112.7 | (361 + 4 + 441)/3 = 268.7

Standard Deviation = 10.6% | 16.4%

Risk and Diversification

$$\text{Portfolio rate of return} = \left(\text{fraction of portfolio in first asset}\right) \times \left(\text{rate of return on first asset}\right) + \left(\text{fraction of portfolio in second asset}\right) \times \left(\text{rate of return on second asset}\right)$$

Portfolio Worksheet

Consider the following:			
	Returns		
Scenario Probability	**Auto**	**Gold**	**Portfolio (75% auto, 25% gold)**
Recession 1/3	-8	+20	.75(-8) + .25 (20) = -1.0%
Normal 1/3	+5	+3	.75(5) + .25 (3) = +4.5%
Boom 1/3	+18	-20	.75(18) + .25 (-20) = +8.5%
Expected Return			
Auto	(-8+5+18)/3 = 5%		
Gold	(+20+3-20)/3 = 1%		
Portfolio	(-1+4.5+8.5)/3 = 4%		
Variance			
Auto	(169+0+169)/3 = 112.7 (std. 10.6%)		
Gold	(361+4+441)/3 = 268.7 (std. 16.4%)		
Portfolio	(25+.25 +20.25)/3 = 15.2 (std 3.9%)		

Risk and Diversification