Lecture 7

Introduction to Risk and Return

Chapter 11/322

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Topics Covered

- Rates of Return: A Review
- Market Indexes
- Measuring Risk
- Risk & Diversification
- Thinking About Risk

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11.1.Rates of Return (ROR)

$$\text{Rates of Return}\left[(\text{percentage return})\right] = \frac{\text{Dividend} + \text{Capital Gain}}{\text{Initial Share Price}}$$

Ex1: suppose you bought the stock of VNM at the beginning of 2004 when its price was $31,12 per share. By the end of the year the value of that investment had appreciated to $31,94. Firm paid a dividend of $5.47 per share

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Rates of Return (Contd)

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

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

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Rates of Return (Contd)

Nominal vs. Real:

$$1 + \text{real ror} = \frac{1 + \text{nominal ror}}{1 + \text{inflation rate}}$$

Ex: previous Ex, in 2004, inflation was 3,3%. Calculate the real rate of return on VNM stock as follows

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11.2.Market Indexes

- **Dow Jones Industrial Average (The Dow)**

  Value of a portfolio holding one share in each of 30 large industrial ("blue-chip") firms.

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

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

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Premium

- **Maturity Premium**

  Extra average return from investing in long- versus short-term Treasury securities.

- **Risk Premium**

  Expected return in excess of risk-free return as compensation for risk.

  Rate of return on common stocks = Risk-free rate + Market risk premium

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Premium (Contd)

Risk Premium

Investment	Average Equivalent Returns
Ordinary Shares	20.2 %
Small Shares	41.7%
10-Year Government Bonds	13.0%

Small shares offer very high risk premium when compared to ordinary shares.

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Expected return

- Expected return= probability-weighted average of possible outcomes

Expected return (μ) = $x_1p_1 + x_2p_2 + \dots + x_mp_m$

- **With :**

X_i: rate of return in period of time I

Pi: percentage in period of time i

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11.3.Measuring Risk

- **Variance** – Average value of squared deviations from mean. A measure of volatility. $Variance = \sum_{i=1}^{N} p_i (x_i - \mu)^2$

  μ: Expected return

- **Standard Deviation** – Square root of variance. Another measure of volatility.

  Standard deviation (SD) = square root of Variance

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Example—Expected Return and Variance

State of Economy	Pi	Return on Asset A	Return on Asset B
Boom	0.40	30%	−5%
Bust	0.60	−10%	25%

- Er, Var, SD

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Examples 1:

Rate of return in company X forecast:

	Probability	Rate of return
Highest boom	0,3	0,5
Boom	0,4	0,4
Normal	0,1	0,3
Recession	0,2	0,2

What is Er, Var, SD?

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Ex 2

- Consider the following scenario analysis

		Rate of return	
Scenario	Probability	stocks	Bonds
Recession	0.20	-5%	+14%
Normal economy	0.50	17%	+7%
Boom	0.30	25%	+4%

a./ Er, Var, SD

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EX3: Measuring Risk (Contd)

Year	Rate of Return	Deviation from Average Return	Squared Deviation
1999	23.7	19.52	381.03
2000	(10.9)	(15.08)	227.41
2001	(11.0)	(15.18)	230.43
2002	(20.9)	(25.08)	629.01
2003	31.6	27.42	751.86
2004	12.6	8.42	70.90
Total	25.1		2,290.63

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Ex4:

year	Rate of return(Ri)
2001	0,1162
2002	0,3749
2003	0,4361
2004	-0,0840

Tinh: $\bar{E}r$, Var, SD ?

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Measuring Risk (Contd)

Example: Coin Toss Game–calculating variance and standard deviation

(1) Percent Rate of Return	(2) Deviation from Mean	(3) Squared Deviation
+40	+30	900
+10	0	0
+10	0	0
-20	-30	900

Variance = average of squared deviations = 1800/4 = 450

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

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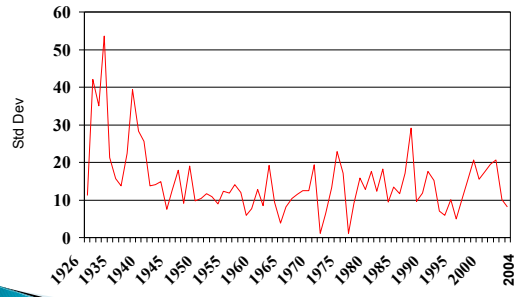
U.S.Stock Market Volatility 1926-2004



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Coefficient of variation

Coefficient of variation(CV): compare risk between the projects

	project A	project B
Er	0,08	0,24
SD	0,06	0,08
CV	0,75	0,33

$$CV = \frac{SD}{Er}$$

CV (A) > CV (B)

Project A risker than project B

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Example—Expected Return and Variance

State of Economy	Pi	Return on Asset A	Return on Asset B
Boom	0.40	30%	−5%
Bust	0.60	−10%	25%

- Er, Var, SD, CV

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- 2 project A,B :

	A	B
Er	15%	20%
SD	0,07	0,09

What is CV ?

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11.4. Portfolio Expected Returns

- A portfolio is a collection of assets.
- An asset's risk and return is important in how it affects the risk and return of the portfolio.
- The risk–return trade-off for a portfolio is measured by the portfolio's expected return and standard deviation, just as with individual assets.

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Portfolio Expected Returns

The expected return of a portfolio is the weighted average of the expected returns for each asset in the portfolio

$$E(Rp) = \sum_{j=1}^{m} wjE(Rj)$$

Wj: fraction of portfolio in J asset
E(Rj): rate of return on first asset J
M: amount asset

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Risk and Diversification (Cont'd)

Portfolio rate of return = fraction of portfolio in first asset x rate of return on first asset + fraction of portfolio in second asset x rate of return on second asset

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Example—Portfolio Return and Variance

Assume 50 per cent of portfolio in asset A and 50 per cent in asset B.

State of Economy	P_i	R_A	R_B
Boom	0.40	30%	–5%
Bust	0.60	–10%	25%

=0,5(0,4.0,3+0.6.(-0,1))+0,5(0,4.(-0,05)+0,6.0,25)=

0,5(0,12 – 0.06) + 0,5(-0,02 + 0,15) = 0,095 or 9,5%

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Ex

❖Portfolio

	stock A	stock B
Er	14%	11,5%
SD	10.7%	1,5%

❖Assume 50 per cent of portfolio in stock A and 50 per cent in stock B. $E_p(x)$?, CVa and CVb ?

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11.4.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" or "non-diversifiable risk".

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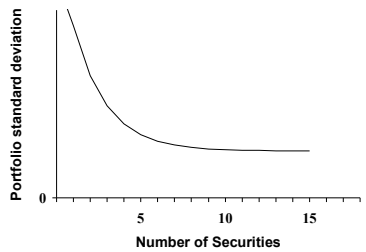
Risk and Diversification (Contd)



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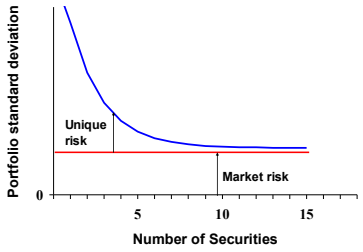
Risk and Diversification (Contd)



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11.5.Thinking about Risk

- Some Risks Look Big and Dangerous but Really Are Diversifiable.
- Market Risks Are Macro Risks, such as changes in interest rate, industrial production, inflation, foreign exchange rate, energy costs, etc.
- Risk Can Be Measured. Market risks are measured by looking at market portfolio. Instead of measuring risk of a single stock, we often measure individual stock's sensitivity to fluctuations of overall stock market.

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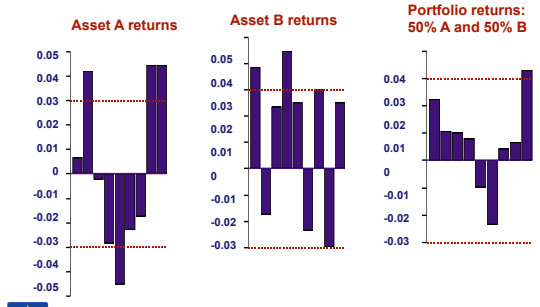
The Effect of Diversification on Portfolio Variance



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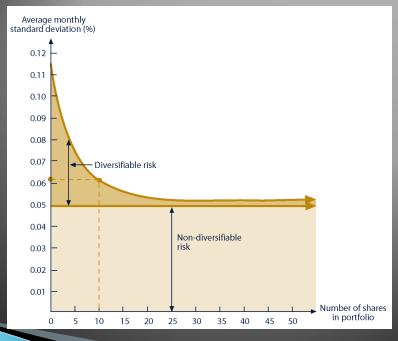
Diversification

- The process of spreading investments across different assets, industries and countries to reduce risk.
- Total risk = systematic risk + non-systematic risk

The Principle of Diversification

- Diversification can substantially reduce the variability of returns without an equivalent reduction in expected returns.
- This reduction in risk arises because worse than expected returns from one asset are offset by better than expected returns from another.
- However, there is a minimum level of risk that cannot be diversified away and that is the systematic portion.

Portfolio Diversification



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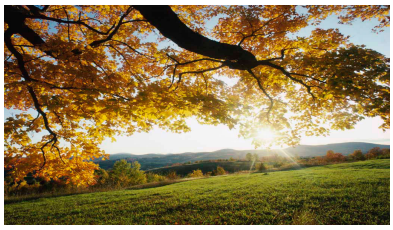

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