PERTEMUAN 13

ANALISIS RISIKO

POKOK BAHASAN

13.1. Risiko dan Ketidakpastian
13.2. Mengukur Risiko dengan Distribusi Probabilitas
13.3. Teori Kepuasan
13.4. Penyesuaian Nilai terhadap Risiko
13.5. Keputusan dalam Ketidakpastian
13.6. Risiko Valuta Asing
13.7. Informasi dan Risiko

13.1. Risiko dan Ketidakpastian

- Risiko
  - Situasi dimana ada lebih dari satu kemungkinan hasil dari suatu keputusan dan peluang dari tiap hasil diketahui
- Ketidakpastian
  - Situasi dimana ada lebih dari satu kemungkinan hasil dari suatu keputusan dan peluang dari tiap hasil tidak diketahui

13.2. Mengukur Risiko dengan Distribusi Probabilitas

- Probabilitas
  - Kesempatan suatu kejadian untuk terjadi
- Distribusi Probabilitas
  - Daftar dari semua kemungkinan kejadian dan probabilitas terjadinya kejadian tersebut
- Laba yang diperkirakan (Expected Profit)

$$E(\pi) = \overline{\pi} = \sum_{i=1}^{n} \pi_i \cdot P_i$$

Mengukur Risiko dengan Distribusi Probabilitas

Perhitungan Expected Profit

Proyek	Kondisi Ekonomi	Probabilitas (P)	Hasil (π)	Nilai Harapan
A	Cerah	0.25	$600	$150
	Normal	0.50	500	250
	Resesi	0.25	400	100
	Expected profit dari Proyek A			$500
B	Cerah	0.25	$800	$200
	Normal	0.50	500	250
	Resesi	0.25	200	50
	Expected profit dari Proyek B			$500

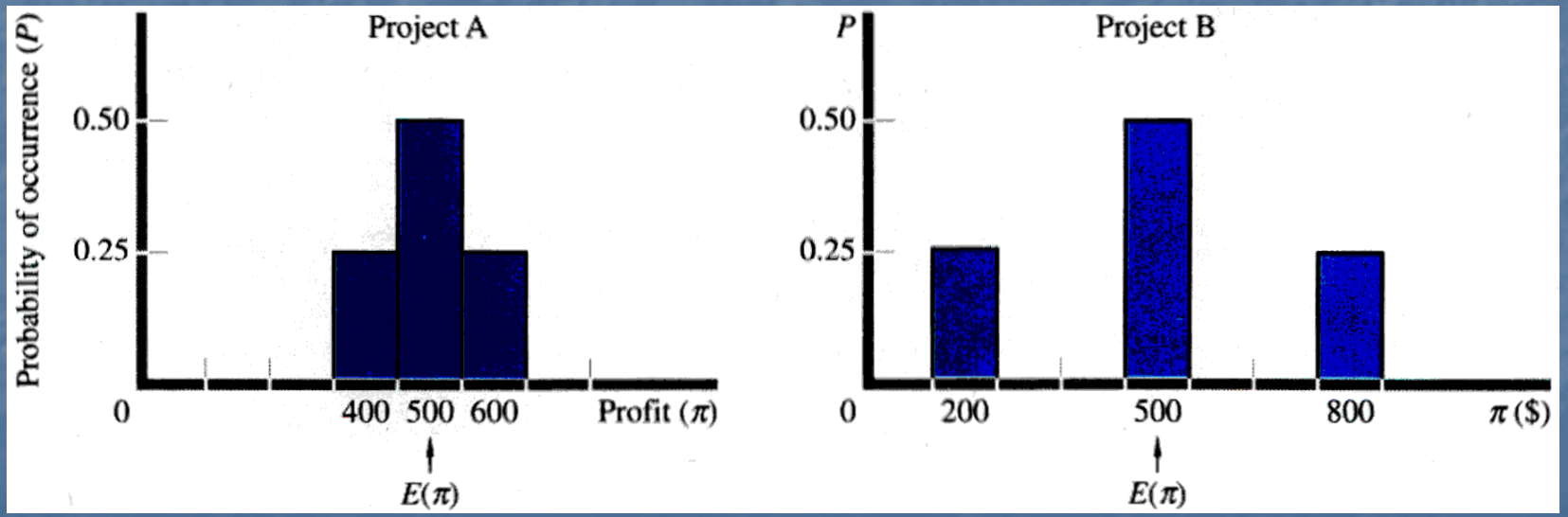
Mengukur Risiko dengan Distribusi Probabilitas

- Distribusi Probabilitas Diskrit
  - Daftar dari kejadian individual dan probabilitasnya
  - Disajikan dalam bar chart atau histogram
- Distribusi Probabilitas Kontinyu
  - Rentang kontinyu dari kejadian dan probabilitasnya
  - Disajikan dalam bentuk kurva

Mengukur Risiko dengan Distribusi Probabilitas

Distribusi Probabilitas Diskrit

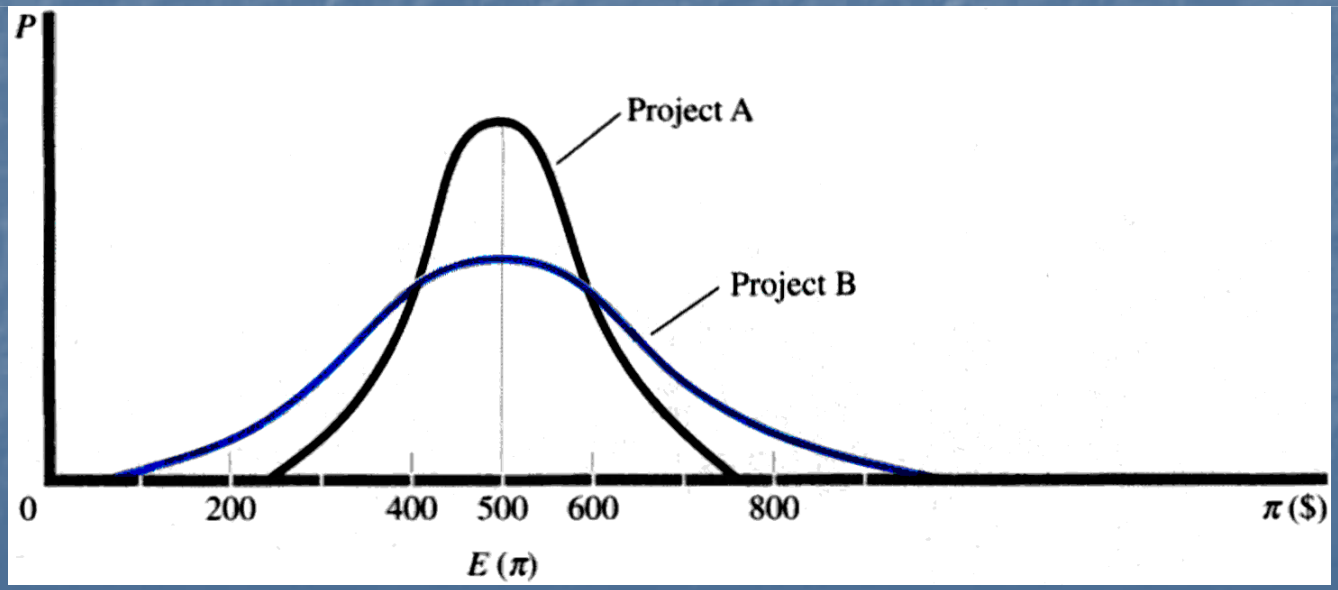
Proyek A; E(π) = 500, Risiko Rendah Proyek B: E(π) = 500, Risiko Tinggi



Mengukur Risiko dengan Distribusi Probabilitas

Distribusi Probabilitas Kontinyu

Proyek A: E(π) = 500, Risiko Rendah Proyek B: E(π) = 500, Risiko Tinggi



Mengukur Risiko dengan Distribusi Probabilitas

Ukuran Absolut dari Risiko: Deviasi Standar

$$\sigma = \sqrt{\sum_{i=1}^{n} (X_i - \bar{X})^2 \cdot P_i}$$

Mengukur Risiko dengan Distribusi Probabilitas

Perhitungan Deviasi Standar Proyek A

$$\sigma = \sqrt{(600-500)^2(0.25)+(500-500)^2(0.50)+(400-500)^2(0.25)}$$

$$\sigma = \sqrt{5,000} = \$70.71$$

Mengukur Risiko dengan Distribusi Probabilitas

Perhitungan Deviasi Standar Proyek B

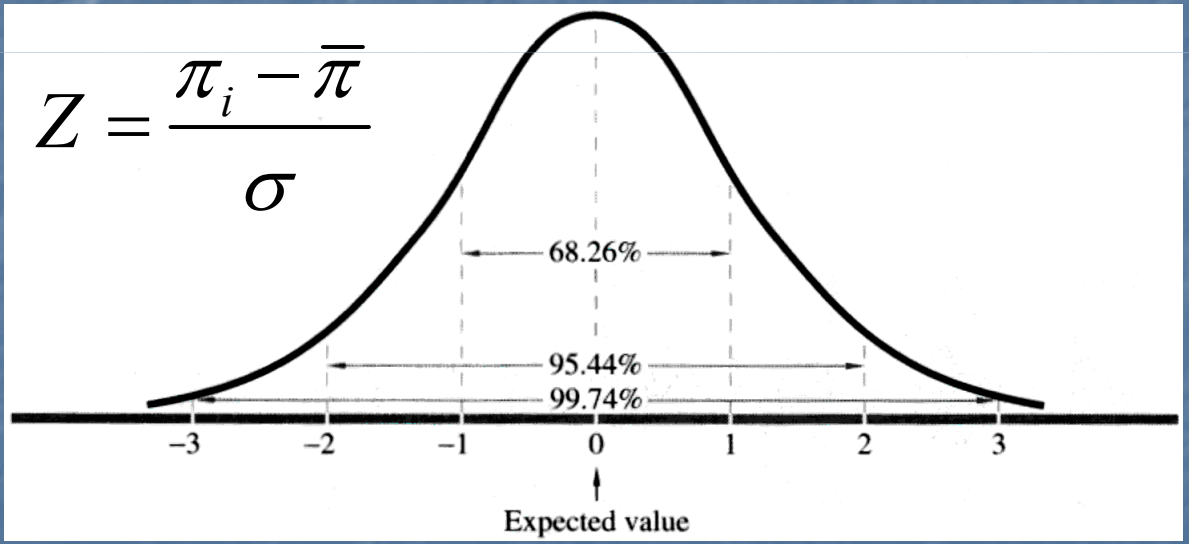
$$\sigma = \sqrt{(800-500)^2(0.25)+(500-500)^2(0.50)+(200-500)^2(0.25)}$$

$$\sigma = \sqrt{45,000} = \$212.13$$

Mengukur Risiko dengan Distribusi Probabilitas

Distribusi Normal

$$Z = \frac{\pi_i - \bar{\pi}}{\sigma}$$



Mengukur Risiko dengan Distribusi Probabilitas

Ukuran Relatif dari Risiko: Koefisien Variasi

$$v = \frac{\sigma}{\bar{\pi}}$$

Proyek A

$$v_A = \frac{70.71}{500} = 0.14$$

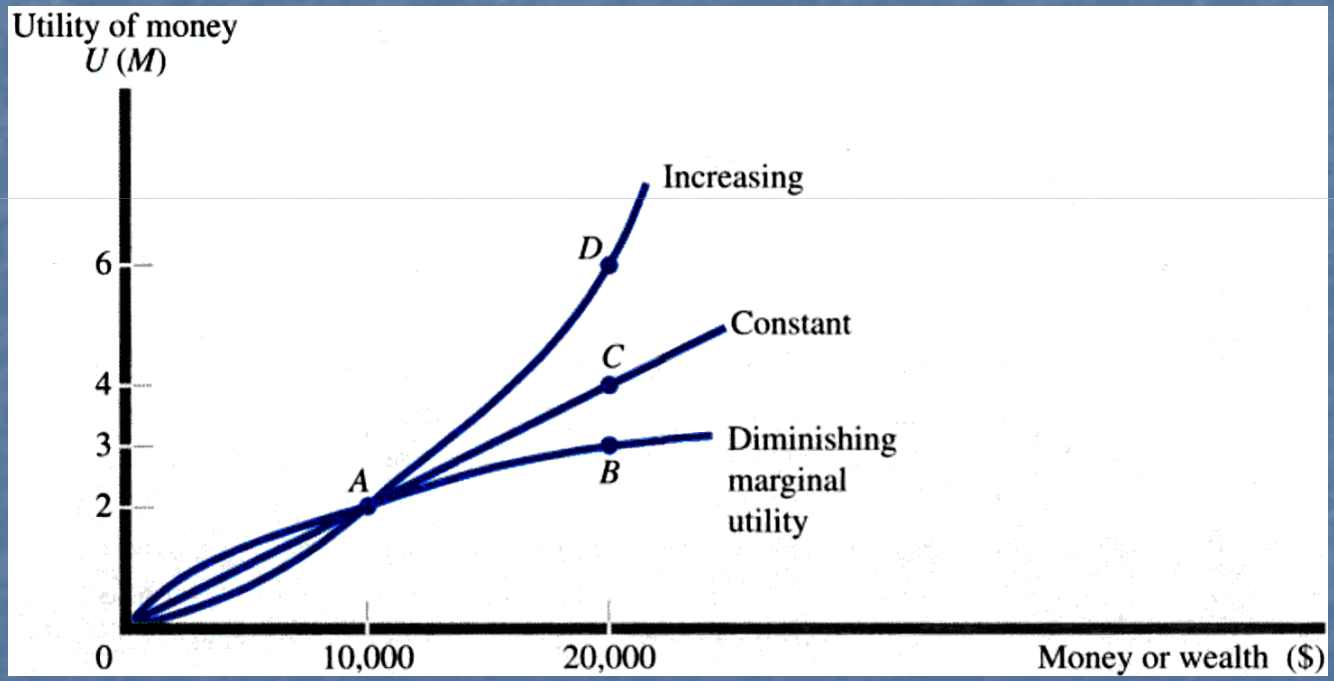
Proyek B

$$v_B = \frac{212.13}{500} = 0.42$$

13.3. Teori Kepuasan

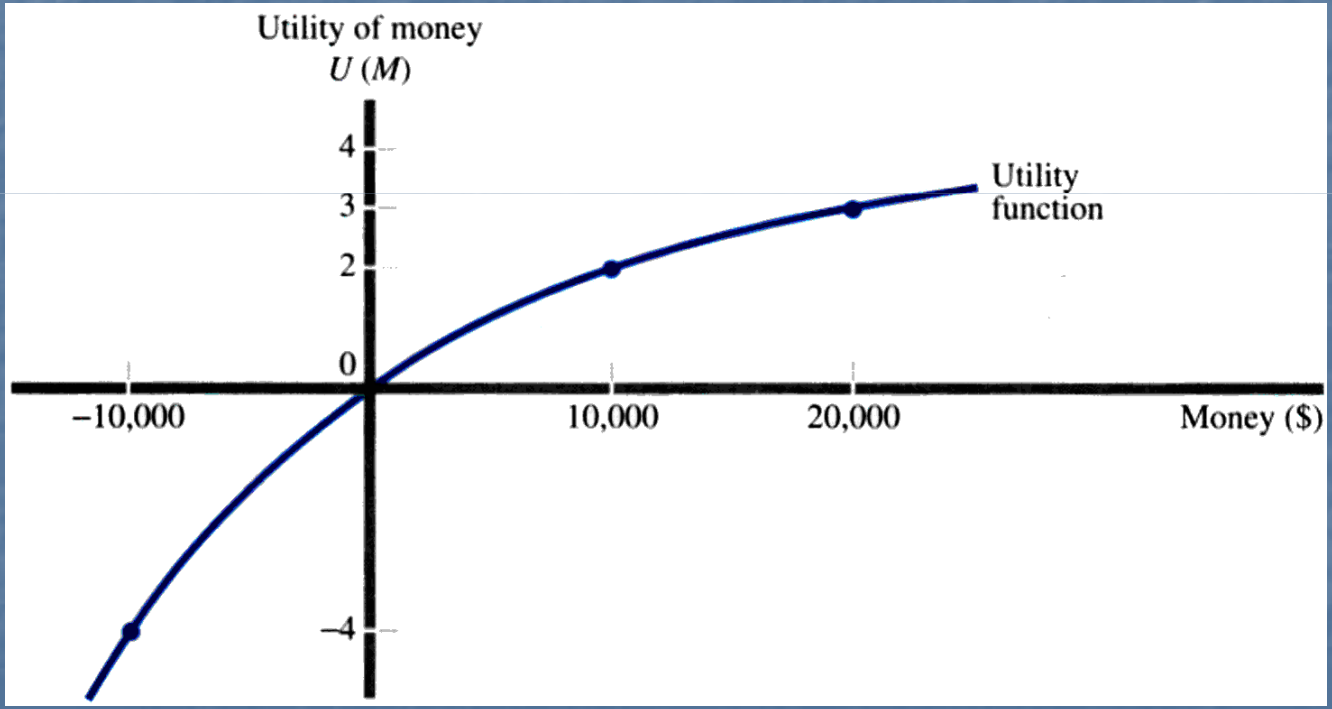
- Menolak Risiko (Risk Averse)
  - Perlu dikompensasi untuk mengambil risiko
  - Kepuasan marjinal atas uang menurun
- Netral terhadap Risiko (Risk Neutral)
  - Indiferen terhadap risiko
  - Kepuasan marjinal atas uang konstan
- Pencari Risiko (Risk Seeking)
  - Lebih suka mengambil risiko
  - Kepuasan marjinal atas uang meningkat

Teori Kepuasan



Teori Kepuasan

Fungsi Kepuasan dari Manajer yang Menolak Risiko



13.4. Penyesuaian Nilai terhadap Risiko

- Nilai Perusahaan = Net Present Value

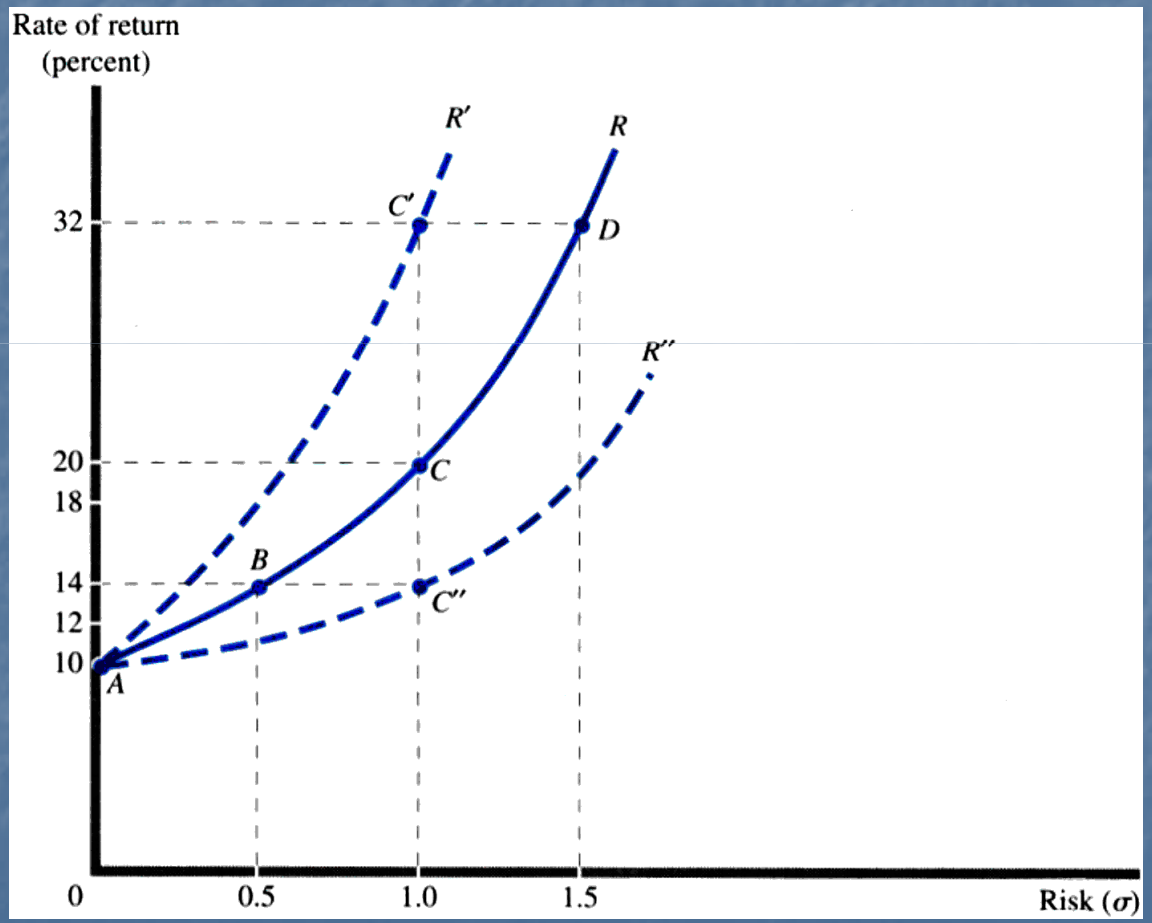
$$NPV = \sum_{t=1}^{n} \frac{\pi_t}{(1+r)^t}$$

- Tingkat Diskonto Penyesuaian Risiko

$$k = r + Risk\ Premium$$

$$NPV = \sum_{t=1}^{n} \frac{\pi_t}{(1+k)^t}$$

Penyesuaian Nilai terhadap Risiko



Penyesuaian Nilai terhadap Risiko

- Pendekatan Certainty Equivalent

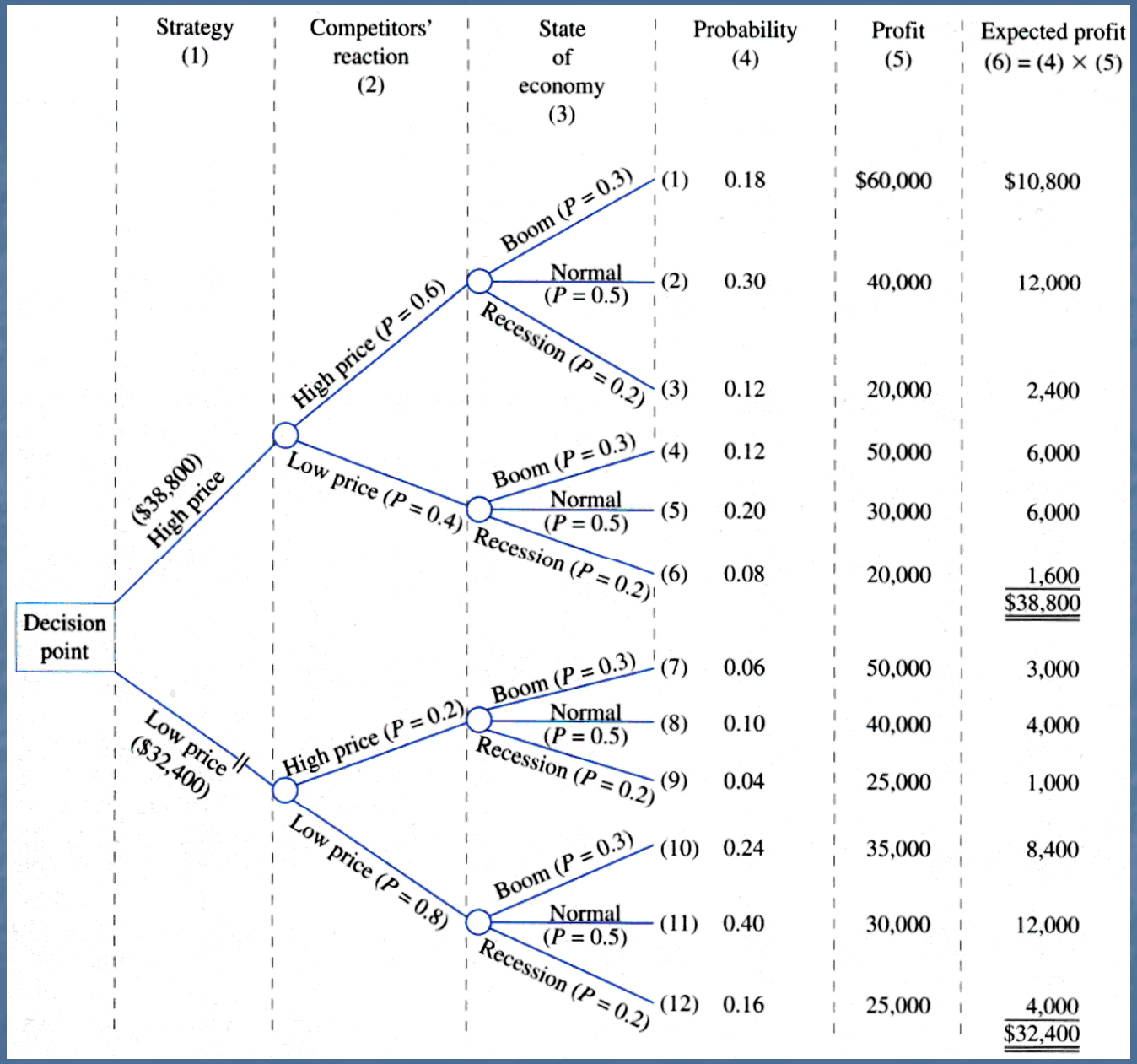
$$NPV = \sum_{t=1}^{n} \frac{\alpha R_t}{(1+r)^t}$$

- Koefisien Certainty Equivalent

$$\alpha = \frac{equivalent\ certain\ sum}{expected\ risky\ sum} = \frac{R_t^*}{R_t}$$

Teknik Lain

- Pohon Keputusan (Decision Trees)
  - Serangkaian kemungkinan keputusan manajerial dan hasil yang diharapkan
  - Probabilitas bersyarat
- Simulasi
  - Analisis sensitivitas


Strategy (1)
Competitors' reaction (2)
State of economy (3)
Probability (4)
Profit (5)
Expected profit (6) = (4) × (5)
Decision point
($38,800) High price
Low price ($32,400)
High price (P = 0.6)
Low price (P = 0.4)
High price (P = 0.2)
Low price (P = 0.8)
Boom (P = 0.3)
Normal (P = 0.5)
Recession (P = 0.2)
(1) 0.18 $60,000 $10,800
(2) 0.30 40,000 12,000
(3) 0.12 20,000 2,400
(4) 0.12 50,000 6,000
(5) 0.20 30,000 6,000
(6) 0.08 20,000 1,600
$38,800
(7) 0.06 50,000 3,000
(8) 0.10 40,000 4,000
(9) 0.04 25,000 1,000
(10) 0.24 35,000 8,400
(11) 0.40 30,000 12,000
(12) 0.16 25,000 4,000
$32,400

13.5. Keputusan dalam Ketidakpastian

- Kriteria Maximin
  - Menentukan kemungkinan hasil terburuk dari setiap strategi
  - Memilih strategi yang memberi hasil terbaik dari yang terburuk

Kriteria Maximin

Matriks di bawah menunjukkan hasil yang dapat diperoleh dari dua kondisi dan dua strategi.

	State of Nature		
Strategy	Success	Failure	Maximin
Invest	20,000	-10,000	-10,000
Do Not Invest	0	0	0

Kriteria Maximin

Matriks di bawah menunjukkan hasil yang dapat diperoleh dari dua kondisi dan dua strategi.

Hasil terburuk strategi “Invest” adalah rugi 10,000. Sedangkan hasil terburuk strategi “Do Not Invest” adalah 0. Strategi maximin adalah yang terbaik dari dua hasil terburuk tersebut, yaitu - Do Not Invest.

	State of Nature		
Strategy	Success	Failure	Maximin
Invest	20,000	-10,000	-10,000
Do Not Invest	0	0	0

Kriteria Minimax Regret

Matriks di bawah menunjukkan hasil yang dapat diperoleh dari dua kondisi dan dua strategi.

	State of Nature	
Strategy	Success	Failure
Invest	20,000	-10,000
Do Not Invest	0	0

Kriteria Minimax Regret

Matriks regret menyajikan kembali perbedaan antara suatu strategi dengan hasil dari strategi terbaik pada kondisi yang sama.

	State of Nature		Regret Matrix	
Strategy	Success	Failure	Success	Failure
Invest	20,000	-10,000	0	10,000
Do Not Invest	0	0	20,000	0

Kriteria Minimax Regret

Untuk tiap strategi, regret maksimum diidentifikasi. Strategi minimax regret adalah yang menghasilkan nilai minimum dari regret yang maksimum.

	State of Nature		Regret Matrix		Maximum
Strategy	Success	Failure	Success	Failure	Regret
Invest	20,000	-10,000	0	10,000	10,000
Do Not Invest	0	0	20,000	0	20,000

Metode Informal

- Pengumpulan informasi tambahan
- Meminta Pendapat Ahli
- Mengendalikan Lingkungan Bisnis
- Diversifikasi

13.6. Risiko Valuta Asing

- Kurs Valuta Asing
  - Harga mata uang asing dalam mata uang domestik
- Hedging
  - Menutup risiko valuta asing
  - Biasanya digunakan pada transaksi forward

Risiko Valuta Asing

- Transaksi Forward
  - Persetujuan untuk membeli atau menjual valuta asing dengan kurs tertentu yang ditetapkan hari ini untuk penyerahan pada tanggal tertentu di masa depan.
- Transaksi Future
  - Terstandarisasi, dan lebih likuid, jenis transaksi forward untuk sejumlah valuta asing yang ditetapkan dimuka dan diserahkan pada tanggal tertentu.

13.7. Informasi dan Risiko

- Informasi Asimetris
  - Situasi dimana salah satu pihak dalam suatu transaksi memiliki informasi yang lebih sedikit dibanding pihak lainnya dalam hubungannya dengan kualitas dari produk yang akan ditransaksikan
- Pilihan yang Bertentangan
  - Masalah yang timbul dari informasi yang asimetris
  - Barang berkualitas rendah menggusur barang berkualitas tinggi keluar dari pasar.

Informasi dan Risiko

- Moral Hazard
  - Kecenderungan peningkatan probabilitas kerugian jika kerugian diasuransikan
- Methode Pengurangan Moral Hazard
  - Spesifikasi pencegahan sebagai syarat untuk mendapatkan asuransi
  - Coinsurance: mengasuransikan hanya sebagian kerugian

LATIHAN 13

1. A firm is considering two business projects. Project A will return a loss of $45 if conditions are poor, a profit of $35 if conditions are good, and a profit of $155 if conditions are excellent. Project B will return a loss of $100 if conditions are poor, a profit of $60 if conditions are good, and a profit of $300 if conditions are excellent. The probability distribution of conditions follows:

Conditions:	Poor	Good	Excellent
Probabilities:	40%	50%	10%

   (i) Calculate the expected value of each project and identify the preferred project according to this criterion.

   (ii) Calculate the standard deviation of each project and identify the project that has the higher level of risk.

   (iii) Calculate the coefficient of variation for each project and identify the preferred project according to this criterion.

2. A firm is considering two business projects. Project A will return a loss of $5 if conditions are poor, a profit of $35 if conditions are good, and a profit of $95 if conditions are excellent. Project B will return a loss of $15 if conditions are poor, a profit of $45 if conditions are good, and a profit of $135 if conditions are excellent. The probability distribution of conditions follows:

Conditions:	Poor	Good	Excellent
Probabilities:	40%	50%	10%

(i) Calculate the expected value of each project and identify the preferred project according to this criterion.

(ii) Calculate the standard deviation of each project and identify the project that has the higher level of risk.

(iii) Calculate the coefficient of variation for each project and identify the preferred project according to this criterion.

3. A firm is considering two business projects. Project A will return a profit of zero if conditions are poor, a profit of $16 if conditions are good, and a profit of $49 if conditions are excellent. Project B will return a profit of $4 if conditions are poor, a profit of $9 if conditions are good, and a profit of $49 if conditions are excellent. The probability distribution of conditions follows:

Conditions:	Poor	Good	Excellent
Probabilities:	40%	50%	10%

(i) Calculate the expected value of each project and identify the preferred project according to this criterion.

(ii) Assume that the firm has determined that its utility function for profit is equal to the square root of profit. Calculate the expected utility of each project and identify the preferred project according to this criterion.

(iii) Is the firm risk averse, risk neutral, or risk seeking? How can you tell?

4. A firm is considering two business projects. Project A will return a profit of zero if conditions are poor, a profit of $4 if conditions are good, and a profit of $8 if conditions are excellent. Project B will return a profit of $2 if conditions are poor, a profit of $3 if conditions are good, and a profit of $4 if conditions are excellent. The probability distribution of conditions follows:

Conditions:	Poor	Good	Excellent
Probabilities:	40%	50%	10%

(i) Calculate the expected value of each project and identify the preferred project according to this criterion.

(ii) Assume that the firm has determined that its utility function for profit is as follows:

$U(X) = X - 0.05X^2$

Calculate the expected utility of each project and identify the preferred project according to this criterion.

(iii) Is the firm risk averse, risk neutral, or risk seeking? How can you tell?

5. A firm is considering three business projects. Project A will return a profit of $5 if conditions are poor, $10 if conditions are good, and $15 if conditions are excellent. Project B will return a profit of $12 if conditions are poor, $8 if conditions are good, and $4 if conditions are excellent. Project C will return a profit of $3 if conditions are poor, $20 if conditions are good, and $7 if conditions are excellent.

   (i) Use the maximin criterion to determine the preferred project. Show how you arrived at your solution.

   (ii) Calculate the regret matrix.

   (iii) Use the minimax regret criterion to determine the preferred project. Show how you arrived at your solution.

6. A firm is considering three business projects. Project A will return a profit of $1 if conditions are poor, $5 if conditions are good, and $8 if conditions are excellent. Project B will return a profit of $2 if conditions are poor, $2 if conditions are good, and $6 if conditions are excellent. Project C will return a profit of $10 if conditions are poor, $1 if conditions are good, and $2 if conditions are excellent.

   (i) Use the maximin criterion to determine the preferred project. Show how you arrived at your solution.

   (ii) Calculate the regret matrix.

   (iii) Use the minimax regret criterion to determine the preferred project. Show how you arrived at your solution.

7. A firm is considering three business projects. Project A will return a profit of $1 if conditions are poor, $7 if conditions are good, and $8 if conditions are excellent. Project B will return a profit of $1 if conditions are poor, $4 if conditions are good, and $11 if conditions are excellent. Project C will return a profit of $8 if conditions are poor, $3 if conditions are good, and $5 if conditions are excellent.

   (i) Use the maximin criterion to determine the preferred project. Show how you arrived at your solution.

   (ii) Calculate the regret matrix.

   (iii) Use the minimax regret criterion to determine the preferred project. Show how you arrived at your solution.

8. A firm is considering three business projects. Project A will return a loss of $5 if conditions are poor, a profit of $4 if conditions are good, and a profit of $8 if conditions are excellent. Project B will return a profit of zero if conditions are poor, a profit of $2 if conditions are good, and a profit of $7 if conditions are excellent. Project C will return a profit of $1 if conditions are poor, $3 if conditions are good, and $5 if conditions are excellent.

   (i) Use the maximin criterion to determine the preferred project. Show how you arrived at your solution.

   (ii) Calculate the regret matrix.

   (iii) Use the minimax regret criterion to determine the preferred project. Show how you arrived at your solution.